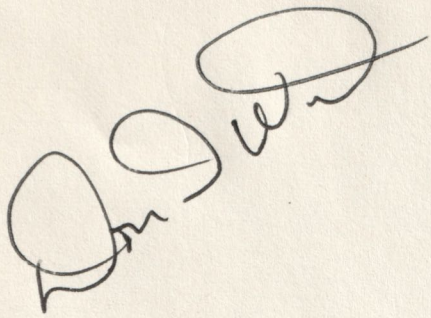


DOS 3.2

Flow of Control
Anotated Disassemblies
Notes

By Don D Worth
Victor Tolomei

COPY 1 OF ~~6~~ 8

DO NOT REPRODUCE

DOS BOOT FLOW OF CONTROL (VERSION 3.2)

(1) USER ENTERS "s^P" TO MONITOR OR "PR#s" TO BASIC (WHERE s IS THE DISK SLOT, 1-7, AND ^P IS CONTROL-P)

(a) MONITOR ROUTINE GETS CONTROL, CONVERTS s TO ADDRESS OF ROM ON BOARD IN SLOT s, $Cs00. THIS ADDRESS IS PLACED AT CSWL ($36) AS THE "OUTPUT INTERCEPT ADDRESS". WHENEVER OUTPUT IS TO BE PLACED ON THE VIDEO SCREEN, THE ROUTINE AT $Cs00 WILL RECEIVE CONTROL.

(b) STANDARD MONITOR PROCESSING CONTINUES. WHEN THE PROMPT (EITHER ">" OR "*") IS TO BE DISPLAYED, ...

(2) THE DISK CONTROLLER CARD ROM BOOT PROGRAM AT $Cs00 BEGINS EXECUTION.

(a) LET'S CALL THIS 256-BYTE ROM PROGRAM "BOOT PHASE 1". BOOT PHASE 1 TURNS DRIVE 1 IN SLOT s ON AND "RECALIBRATES" THE DISK ARM (MOVES IT TO TRACK 0 AT THE OUTMOST CIRCUMFERENCE). THIS CREATES THE CLICKING SOUND FOR A FEW SECONDS.

(b) PHASE 1 THEN READS THE FIRST 256-BYTE SECTOR ON THAT TRACK (TRACK Ø, SECTOR Ø) INTO RAM PAGE 3 ($3ØØ - $3FF).

(c) IF THIS IS SUCCESSFUL (A CHECKSUM IS CALCULATED AND COMPARED WITH ONE AT $3ØØ), THE RAM BOOT PHASE 2 PROGRAM HAS BEEN LOADED. PHASE 1 (AT $CsF9) JUMPS TO THIS ROUTINE TO CONTINUE DOS BOOT...

(3) RAM BOOT PHASE 2 AT $3Ø1 BEGINS EXECUTION.

(a) USING THE SUBROUTINE LOCATED IN ROM BOOT PHASE 1 AT $CsSD WHICH READS DISK SECTORS ON TRACK Ø, RAM BOOT PHASE 2 READS THE NEXT 9 SECTORS ON TRACK Ø (TRACK Ø SECTOR 1 TO TRACK Ø SECTOR 9) TO RAM PAGES $36 TO $3F ($36ØØ - $3FFF) FOR A "MASTER" DISKETTE OR 16K "SLAVE", TO $76ØØ - $7FFF FO A 32K SLAVE, OR TO $B6ØØ - $BFFF FOR A 48K SLAVE.

(b) THESE LOCATIONS $xGØØ - $xFFF PERFORM TWO FUNCTIO

- IT WILL EVENTUALLY BE THE SECOND HALF OF DOS, INCLUDING "RWTS" (THE "READ-WRITE-TRACK-SECTOR" PROGRAM
- THE ROUTINE AT $x7ØØ IS NEEDED FOR

(c) RAM PHASE 2 (AT $343) JUMPS TO $X700 TO FINISH BOOTING ...

(1) RAM BOOT PHASE 3 AT $X700 BEGINS EXECUTION

(a) THIS WILL LOAD ALL REMAINING PARTS OF DOS WHICH ARE DEPENDENT ON DOS RELEASE (VERSION NUMBER) AND WHETHER DISKETTE IS A "SLAVE" OR A "MASTER"

(b) <u>IF MASTER</u>: USING THE RWTS ROUTINE AT $XD00, RAM BOOT PHASE 3 LOADS THE FIRST HALF OF DOS INTO RAM. THIS COMPRISES THE NEXT 27 SECTORS ON THE DISK (TRACK 0 SECTOR $A TO TRACK 2 SECTOR $D). THESE ARE READ INTO RAM PAGES $1B TO $35 ($1B00 TO $35FF), BUMPING UP AGAINST DOS 2ND HALF AT $3600 LOADED IN STEP (3) ABOVE. DOS IS NOW COMPLETELY LOADED. BUT, THE ACTUAL DOS BEGINS AT $1D00 AND EXTENDS TO $3FFF, SET UP TO RUN AS IS ON A 16K MACHINE ONLY. A "MASTER" DOS IS TO RUN ON ANY SIZE APPLE (ABOVE 16K) SO A "DOS RELOCATOR" PROGRAM WAS INCLUDED AT $1B00 - $1CFF ABOVE THIS DOS. ROM BOOT PHASE 3 (AT $3747)

JUMPS TO $1B03 (RELOCATOR ENTRY POINT) TO CREATE A DOS FOR THE RIGHT SIZE MACHINE. SEE STEP (5).

(c) IF SLAVE! FOR A SLAVE DISKETTE, RAM BOOT PHASE 3 LOADS A PRE-RELOCATED FIRST HALF OF DOS (CURRENT AT THE TIME OF THE DISK "INIT") DIRECTLY INTO $1D00-$35FF (16K), OR $5D00-$75FF (32K), OR $9D00-$B5FF (48K). THIS IS OBTAINED FROM THE NEXT 25 DISK SECTORS TRACK 0 SECTOR $A TO TRACK 2 SECTOR $B. THE RELOCATOR IS NOT INCLUDED AND NOT USED, SINCE THIS DOS IS ALREADY RELOCATED. (NOTE: IT MAY BE THE WRONG DOS FOR THE SIZE MACHINE). HERE RAM BOOT PHASE 3 AT $x747 DOES NOT JUMP TO $1B03 RELOCATOR BUT DIRECTLY TO DOS COLDSTART PROCESSING AT $xD84. BOOT IS COMPLETE, SKIP TO STEP (6).

(5) DOS RELOCATOR AT $1800 BEGINS EXECUTION (MASTER DISKETTE ONLY).

(a) RELOCATOR IS IN RAM $1800-$1CFF. UNRELOCATED DOS IS IN RAM $1D00-$3FFF. RELOCATOR FIRST FINDS THE LAST PAGE WHERE RAM ACTUALLY EXISTS ($3F ON 16K, $7F ON 32K, $BF ON 48K MACHINES).

(b)

(c) TO FORCE DOS TO BE AT THE HIGHEST RAM LOCATIONS POSSIBLE, $1D00-$3FFF IS RELOCATED TO $5D00-$7FFF (32K) OR $9D00-$BFFF (48K). IF 16K MACHINE IS USED, RELOCATOR HAS NOTHING TO DO BUT JUMP (AT $1B61) TO DOS COLDSTART. (SEE STEP (6)).

(d) (MACHINES LARGER THAN 16K ONLY): USING A TABLE OF ADDRESS RANGES (AT $1C29), RELOCATOR FIRST RELOCATES ALL 2-BYTE DOS ADDRESS CONSTANTS.

(e) USING ANOTHER SIMILAR TABLE (AT $1C5A) RELOCATOR RELOCATES ALL 3-BYTE 6502 INSTRUCTIONS WHOSE ABSOLUTE ADDRESSES ARE WITHIN PAGES $1D-$3F.

(f) RELOCATOR COPIES THE NEW DOS ($1D00-$3F TO THE TOP OF RAM WHERE IT SHOULD RESIDE ($5D00-$7FFF OR $9D00-$BFFF

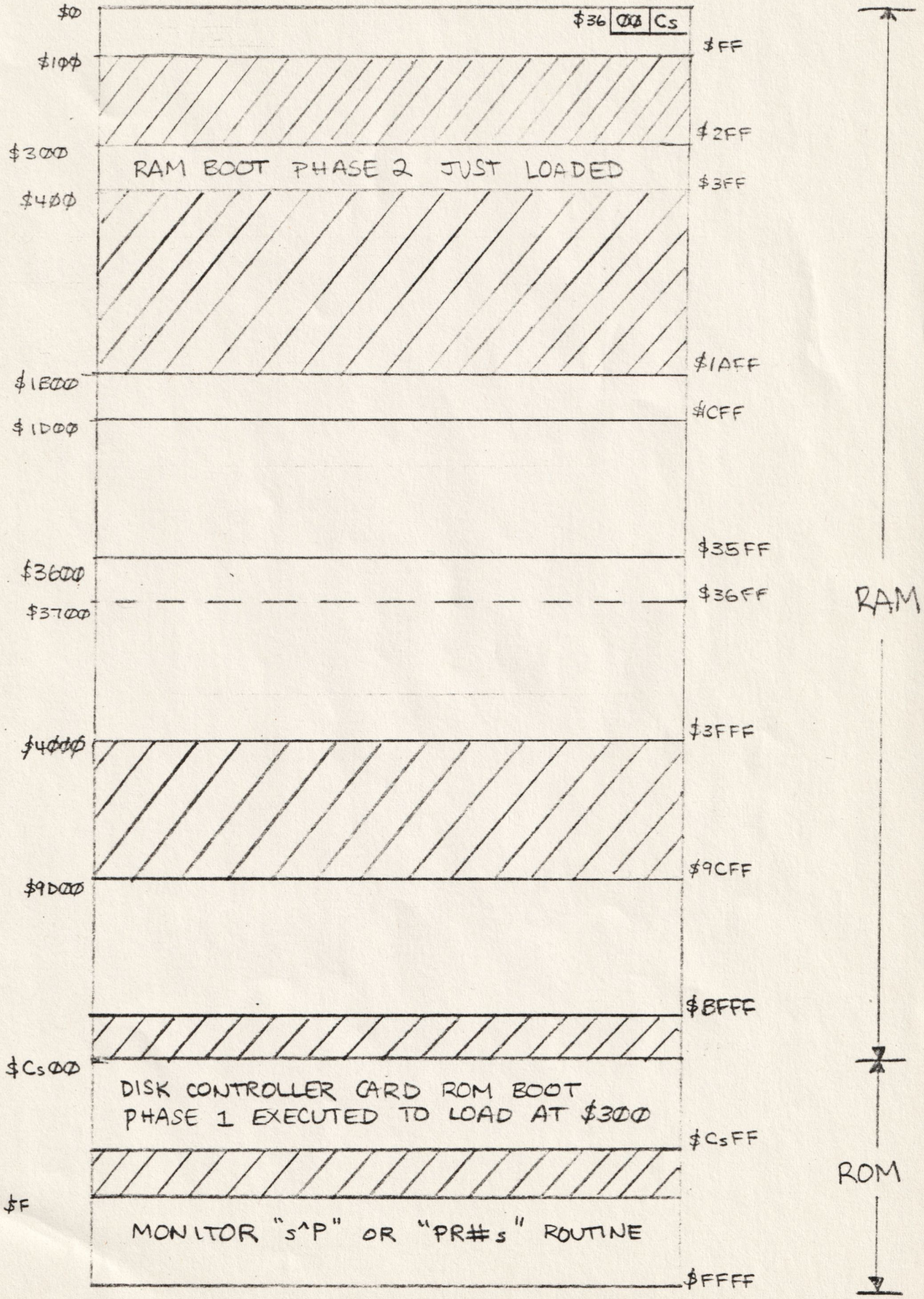
(g) RELOCATOR JUMPS (AT $1C25) TO DOS COLDSTART TO INITIALIZE DOS,

(6) DOS COLDSTART AT $XD84 BEGINS EXECUTION

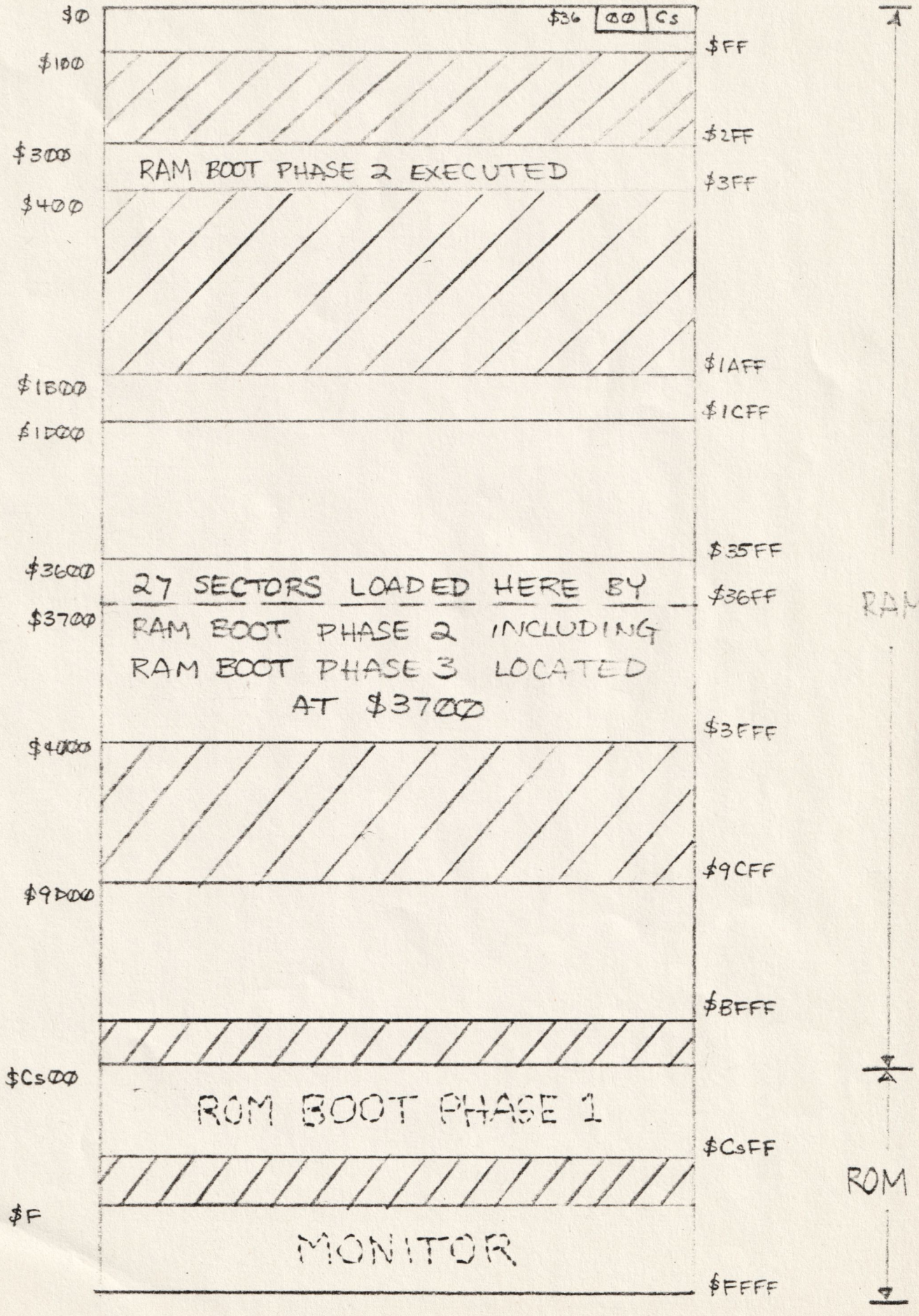
(a) "COLDSTART" INITIALIZES THE NOW BOOTED AND RELOCATED OPERATING SYSTEM

(b) INITIALIZATION OCCURS AND PROPER BASIC (INTEGER OR FLOATING, ROM OR ROM CARD) IS GIVEN CONTROL

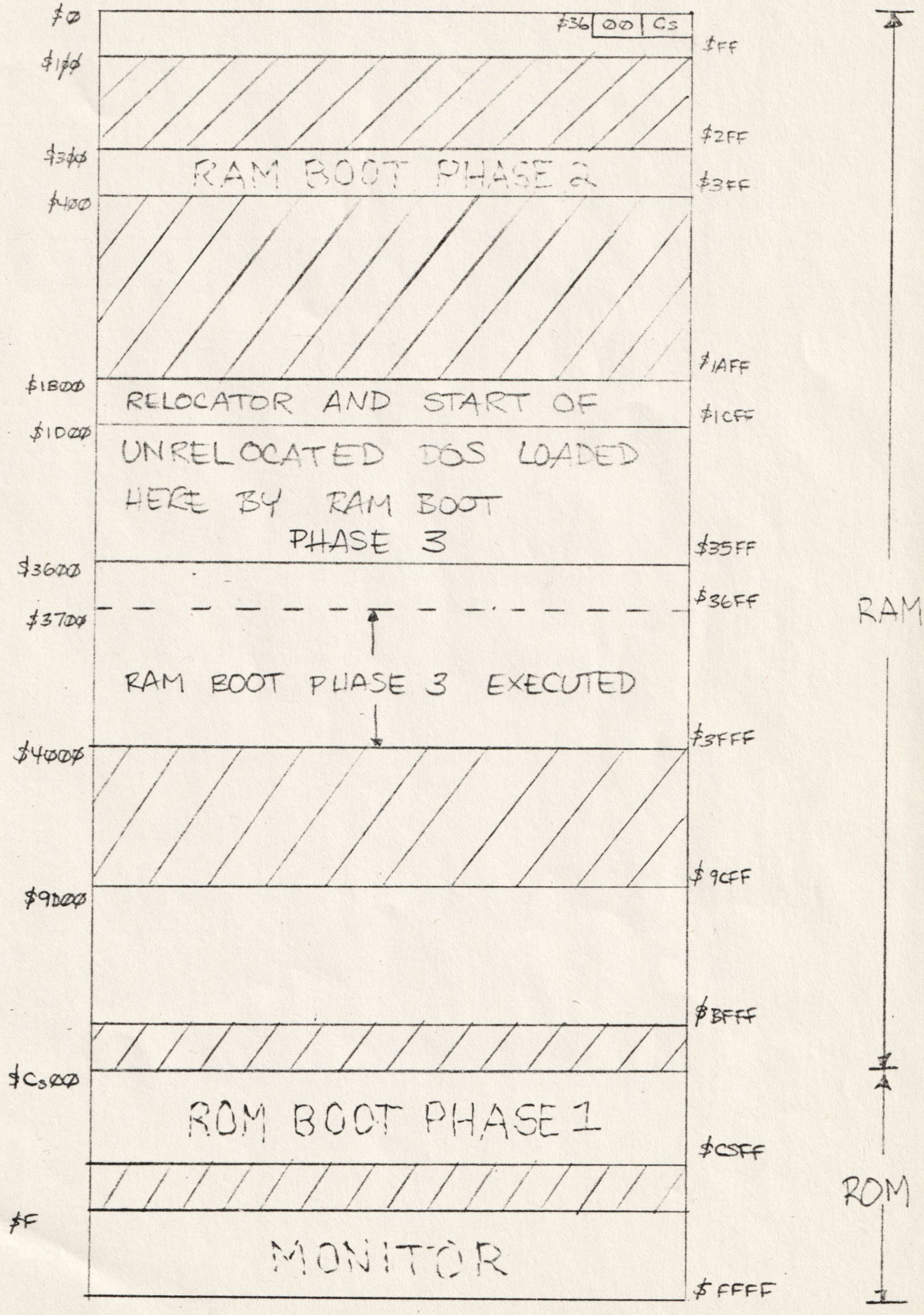
MEMORY MAP ON 48K APPLE AFTER STEPS (1) AND (2) OF A DOS MASTER DISKETTE BOOT



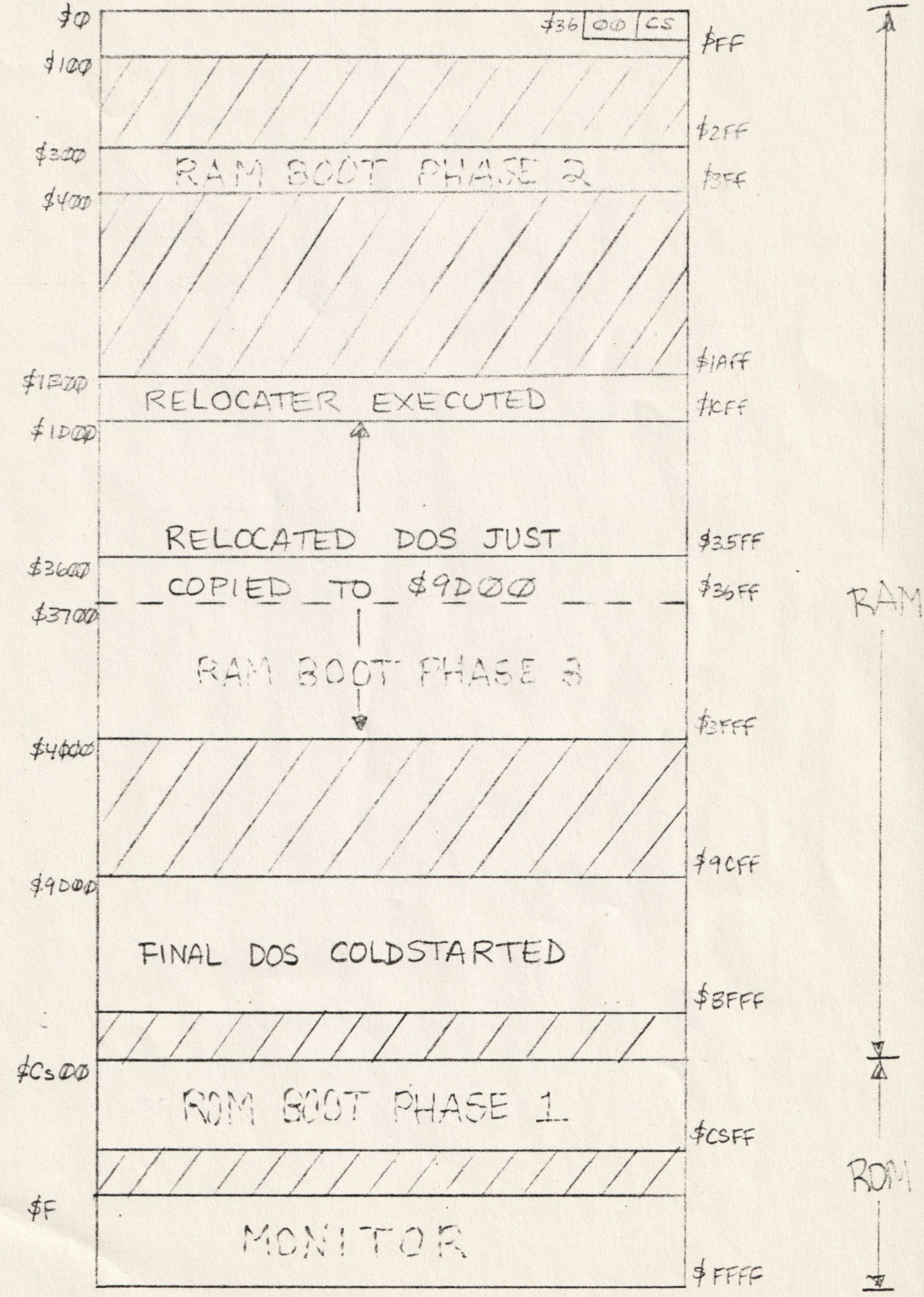
MEMORY MAP ON 48K APPLE AFTER STEP (3) OF DOS MASTER BOOT.



MEMORY MAP ON 48K APPLE AFTER STEP (4) OF DOS MASTER BOOT



MEMORY MAP ON 48K APPLE AFTER STEP (5) & (6) OF DOS MASTER BOOT



DOS DISK II ROM BOOTSTRAP

($CsØØ-$CsFF, s=slot)

DOS DISK II ROM BOOTSTRAP

```
C700-  A2 20      LDX  #$20
C702-  A0 00      LDY  #$00
C704-  A9 03      LDA  #$03
C706-  85 3C      STA  $3C
C708-  18         CLC
C709-  88         DEY
C70A-  98         TYA
C70B-  24 3C      BIT  $3C
C70D-  F0 F5      BEQ  $C704
C70F-  26 3C      ROL  $3C
C711-  90 F8      BCC  $C70B
C713-  C0 D5      CPY  #$D5
C715-  F0 ED      BEQ  $C704
C717-  CA         DEX
C718-  8A         TXA
C719-  99 00 08   STA  $0800,Y
C71C-  D0 E6      BNE  $C704
C71E-  20 58 FF   JSR  $FF58
C721-  BA         TSX
C722-  BD 00 01   LDA  $0100,X
C725-  48         PHA
C726-  0A         ASL
C727-  0A         ASL
C728-  0A         ASL
C729-  0A         ASL
C72A-  85 2B      STA  $2B
C72C-  AA         TAX
C72D-  A9 D0      LDA  #$D0
C72F-  48         PHA
C730-  BD 8E C0   LDA  $C08E,X
C733-  BD 8C C0   LDA  $C08C,X
C736-  BD 8A C0   LDA  $C08A,X
C739-  BD 89 C0   LDA  $C089,X
C73C-  A0 50      LDY  #$50
C73E-  BD 80 C0   LDA  $C080,X
C741-  98         TYA
C742-  29 03      AND  #$03
C744-  0A         ASL
C745-  05 2B      ORA  $2B
C747-  AA         TAX
C748-  BD 81 C0   LDA  $C081,X
C74B-  A9 56      LDA  #$56
C74D-  20 A8 FC   JSR  $FCA8
C750-  88         DEY
C751-  10 EB      BPL  $C73E
C753-  A9 03      LDA  #$03
C755-  85 27      STA  $27
C757-  A9 00      LDA  #$00
C759-  85 26      STA  $26
C75B-  85 3D      STA  $3D
C75D-  18         CLC
C75E-  08         PHP
C75F-  BD 8C C0   LDA  $C08C,X
C762-  10 FB      BPL  $C75F
C764-  49 D5      EOR  #$D5
C766-  D0 F7      BNE  $C75F
C768-  BD 8C C0   LDA  $C08C,X
C76B-  10 FB      BPL  $C768
C76D-  C9 AA      CMP  #$AA
C76F-  D0 F3      BNE  $C764
C771-  EA         NOP
```

DYNAMICALLY BUILD TRANSLATE TABLE FOR DISK CODES AT HIGH END OF PAGE 8 ($8AA - $8FF)

EG: +AB = ØØ
AD = Ø1
AE = Ø2
AF = Ø3
B5 = Ø4
B6 = Ø5
etc.

(RTS)

GET RETURN ADDRESS FROM STACK TO DETERMINE THE SLOT NUMBER OF THIS DISK UNIT.

SAVE SØ (EG: 7Ø)

PRETEND C75D SUBROUTINE ENTERED VIA JSR. EXIT TO C7D1

CLEAR DISK LATCHES (READ MODE)

SELECT DRIVE 1
TURN IT ON

RECAL DISK ARM TO TRACK Ø

(DELAY)

READ SECTOR Ø (TRACK Ø) TO LOCATION $3ØØ

(IMPLIED JSR)

LOCATE & READ SECTOR

READ DISK LOOKING FOR (D5) HEADER

NEXT FIND (AA)

```
C772-  BD 8C C0    LDA   $C08C,X
C775-  10 FB       BPL   $C772
C777-  C9 B5       CMP   #$B5
C779-  F0 09       BEQ   $C784
C77B-  28          PLP
C77C-  90 DF       BCC   $C75D
C77E-  49 AD       EOR   #$AD
C780-  F0 1F       BEQ   $C7A1
C782-  D0 D9       BNE   $C75D
C784-  A0 03       LDY   #$03
C786-  84 2A       STY   $2A
C788-  BD 8C C0    LDA   $C08C,X
C78B-  10 FB       BPL   $C788
C78D-  2A          ROL
C78E-  85 3C       STA   $3C
C790-  BD 8C C0    LDA   $C08C,X
C793-  10 FB       BPL   $C790
C795-  25 3C       AND   $3C
C797-  88          DEY
C798-  D0 EE       BNE   $C788
C79A-  28          PLP
C79B-  C5 3D       CMP   $3D
C79D-  D0 BE       BNE   $C75D
C79F-  B0 BD       BCS   $C75E
C7A1-  A0 9A       LDY   #$9A
C7A3-  84 3C       STY   $3C
C7A5-  BC 8C C0    LDY   $C08C,X
C7A8-  10 FB       BPL   $C7A5
C7AA-  59 00 08    EOR   $0800,Y
C7AD-  A4 3C       LDY   $3C
C7AF-  88          DEY
C7B0-  99 00 08    STA   $0800,Y
C7B3-  D0 EE       BNE   $C7A3
C7B5-  84 3C       STY   $3C
C7B7-  BC 8C C0    LDY   $C08C,X
C7BA-  10 FB       BPL   $C7B7
C7BC-  59 00 08    EOR   $0800,Y
C7BF-  A4 3C       LDY   $3C
C7C1-  91 26       STA   ($26),Y
C7C3-  C8          INY
C7C4-  D0 EF       BNE   $C7B5
C7C6-  BC 8C C0    LDY   $C08C,X
C7C9-  10 FB       BPL   $C7C6
C7CB-  59 00 08    EOR   $0800,Y
C7CE-  D0 8D       BNE   $C75D
C7D0-  60          RTS
C7D1-  A8          TAY
C7D2-  A2 00       LDX   #$00
C7D4-  B9 00 08    LDA   $0800,Y
C7D7-  4A          LSR
C7D8-  3E CC 03    ROL   $03CC,X
C7DB-  4A          LSR
C7DC-  3E 99 03    ROL   $0399,X
C7DF-  85 3C       STA   $3C
C7E1-  B1 26       LDA   ($26),Y
C7E3-  0A          ASL
C7E4-  0A          ASL
C7E5-  0A          ASL
C7E6-  05 3C       ORA   $3C
C7E8-  91 26       STA   ($26),Y
C7EA-  C8          INY
C7EB-  E8          INX
C7EC-  E0 33       CPX   #$33
```

IF NEXT IS (B5) THIS IS A SECTOR ADDRESS (WHICH DO WE WANT?)

IF (AD) THIS IS SECTOR DATA

SECTOR ADDRESS - WHICH SECTOR?

READ VOL#, TRK#, SECTOR # (STORED AS DOUBLE BYTES OF ALTERNATING BITS)

(3 ITEMS)

IS THIS THE SECTOR?
NO, KEEP LOOKING AT SECTOR ADDRESSES
YES, FIND SECTOR DATA NOW

SECTOR DATA

FILL 153 BYTE SECONDARY DATA BUFFER AT $800

FILL 256 BYTE PRIMARY DATA BUFFER AT [$26,$27]

GET CHECKSUM

VALID? (NO I/O ERROR)

EXIT SUBROUTINE (RESUME ROM BOOT)

```
ØØØ A1 A2A3A4A5
ØØØØ A1A2A3A4   C=A5
ØØF1F2 F3F4F5A5
ØØØØ Ø A1A2A3   C=A4
ØØE1E2 E3E4E5A4
ØØØD1 D2D3D4D5
D1D2D3D4 D5A1A2A3
```

MERGE DATA BITS FROM SECONDARY TO PRIMARY BUFFER

DO 3 SEGMENTS OF 51

```
C7EE-   D0 E4       BNE   $C7D4
C7F0-   C6 2A       DEC   $2A
C7F2-   D0 DE       BNE   $C7D2
C7F4-   CC 00 03    CPY   $0300
C7F7-   D0 03       BNE   $C7FC
C7F9-   4C 01 03    JMP   $0301
C7FC-   4C 2D FF    JMP   $FF2D
C7FF-   FF          ???
```

CHECK DATA FOR INTEGRITY

IF GOOD, GO TO RAM BOOT LOADER
ELSE, "ERR" AND BELL

DOS 3.2 RAM BOOTSTRAP LOADER & EPA VECTOR

($300-$3FF)

DOS 3.2 BOOTSTRAP & VECTOR

(TRACK Ø SECTOR Ø)

CHECKSUM

```
0300-  99 B9 00   LDA   $800,Y
0303-  08
0304-  0A         ASL
0305-  0A         ASL
0306-  0A         ASL
0307-  99 00 08   STA   $0800,Y
030A-  C8         INY
030B-  D0 F4      BNE   $0301
030D-  A6 2B      LDX   $2B
030F-  A9 09      LDA   #$09
0311-  85 27      STA   $27
0313-  AD CC 03   LDA   $03CC
0316-  85 41      STA   $41
0318-  84 40      STY   $40
031A-  8A         TXA
031B-  4A         LSR
031C-  4A         LSR
031D-  4A         LSR
031E-  4A         LSR
031F-  09 C0      ORA   #$C0
0321-  85 3F      STA   $3F
0323-  A9 5D      LDA   #$5D
0325-  85 3E      STA   $3E
0327-  20 43 03   JSR   $0343
032A-  20 46 03   JSR   $0346
032D-  A5 3D      LDA   $3D
032F-  4D FF 03   EOR   $03FF
0332-  F0 06      BEQ   $033A
0334-  E6 41      INC   $41
0336-  E6 3D      INC   $3D
0338-  D0 ED      BNE   $0327
033A-  85 3E      STA   $3E
033C-  AD CC 03   LDA   $03CC
033F-  85 3F      STA   $3F
0341-  E6 3F      INC   $3F
0343-  6C 3E 00   JMP   ($003E)
0346-  A2 32      LDX   #$32
0348-  A0 00      LDY   #$00
034A-  BD 00 08   LDA   $0800,X
034D-  4A         LSR
034E-  4A         LSR
034F-  4A         LSR
0350-  85 3C      STA   $3C
0352-  4A         LSR
0353-  85 2A      STA   $2A
0355-  4A         LSR
0356-  1D 00 09   ORA   $0900,X
0359-  91 40      STA   ($40),Y
035B-  C8         INY
035C-  BD 33 08   LDA   $0833,X
035F-  4A         LSR
0360-  4A         LSR
0361-  4A         LSR
0362-  4A         LSR
0363-  26 3C      ROL   $3C
0365-  4A         LSR
0366-  26 2A      ROL   $2A
0368-  1D 33 09   ORA   $0933,X
036B-  91 40      STA   ($40),Y
036D-  C8         INY
```

SHIFT DISK CODE TRANSLATE TABLE LEFT 3 BIT POSITIONS

GET SLOT*16 (SØ)

USE $9ØØ FOR DISK BUFFER

WHERE TO PUT DOS AT HIMEM (16K IN THIS CASE PRIOR TO RELOCATION)

CONSTRUCT ADDRESS OF DISK SECTOR READ SUBROUTINE IN DISK ROM

Cs5D: s = slot #

JSR $Cs5D – READ NEXT SECTOR

MERGE BUFFERS TO [40,41]

WHEN SECTOR=9, ALL ARE READ

ELSE, NEXT PAGE/SECTOR

GET LOAD POINT AGAIN ($36ØØ)

GO TO DOS LOADER ($37ØØ)

DISK BUFFER MERGE SUBR.

$A_1A_2A_3A_4$ A_5ØØØ

MERGE $8ØØ/$9ØØ TO [$4Ø, $41]

ØØØA_1 $A_2A_3A_4A_5$

ØØØØ $A_1A_2A_3A_4$

ØØØØ Ø$A_1A_2A_3$

$D_1D_2D_3D_4$ $D_5A_1A_2A_3$

— 1ST ALTERNATING BYTE —

$B_1B_2B_3B_4$ B_5ØØØ

ØØØØ $B_1B_2B_3B_4$ C=B_5

ØØA_1A_2 $A_3A_4A_5B_5$

ØØØØ Ø$B_1B_2B_3$ C=B_4

ØØØA_1 $A_2A_3A_4B_4$

$D_1D_2D_3D_4$ $D_5B_1B_2B_3$

— 2ND ALTERNATING BYTE —

```
036E-  BD 66 08   LDA  $0866,X
0371-  4A         LSR
0372-  4A         LSR
0373-  4A         LSR
0374-  4A         LSR
0375-  26 3C      ROL  $3C
0377-  4A         LSR
0378-  26 2A      ROL  $2A
037A-  1D 66 09   ORA  $0966,X
037D-  91 40      STA  ($40),Y
037F-  C8         INY
0380-  A5 2A      LDA  $2A
0382-  29 07      AND  #$07
0384-  1D 99 09   ORA  $0999,X
0387-  91 40      STA  ($40),Y
0389-  C8         INY
038A-  A5 3C      LDA  $3C
038C-  29 07      AND  #$07
038E-  1D CC 09   ORA  $09CC,X
0391-  91 40      STA  ($40),Y
0393-  C8         INY
0394-  CA         DEX
0395-  10 B3      BPL  $034A
0397-  AD 99 08   LDA  $0899
039A-  4A         LSR
039B-  4A         LSR
039C-  4A         LSR
039D-  0D FF 09   ORA  $09FF
03A0-  91 40      STA  ($40),Y
03A2-  A6 2B      LDX  $2B
03A4-  60         RTS
```

$C_1C_2C_3C_4$ C_5 Ø Ø Ø

Ø Ø Ø Ø $C_1C_2C_3C_4$ $C=C_5$
Ø $A_1A_2A_3$ $A_4A_5B_5C_5$
Ø Ø Ø Ø Ø C_1 C_2 C_3 $C=C_4$
Ø Ø A_1A_2 $A_3A_4B_4C_4$
$D_1D_2D_3D_4$ $D_5C_1C_2C_3$
— 3rd ALTERNATING BYTE —

Ø Ø Ø Ø Ø A_4 B_4 C_4
$E_1E_2E_3E_4$ $E_5A_4B_4C_4$
— 4TH ALTERNATING BYTE —

Ø Ø Ø Ø Ø A_5 B_5C_5
$F_1F_2F_3F_4$ $F_5A_5B_5C_5$
— 5TH ALTERNATING BYTE —

DO 51 GROUPS OF 5 BYTES

THEN THE LAST BYTE TO MAKE 256

RESTORE SLOT #
AND EXIT

```
03A5-  FF         ???
03A6-  FF         ???
03A7-  FF         ???
03A8-  FF         ???
03A9-  FF         ???
03AA-  FF         ???
03AB-  FF         ???
03AC-  FF         ???
03AD-  FF         ???
03AE-  FF         ???
03AF-  FF         ???
03B0-  FF         ???
03B1-  FF         ???
03B2-  FF         ???
03B3-  FF         ???
03B4-  FF         ???
03B5-  FF         ???
03B6-  FF         ???
03B7-  FF         ???
03B8-  FF         ???
03B9-  FF         ???
03BA-  FF         ???
03BB-  FF         ???
03BC-  FF         ???
03BD-  FF         ???
03BE-  FF         ???
03BF-  FF         ???
03C0-  FF         ???
03C1-  FF         ???
03C2-  FF         ???
03C3-  FF         ???
03C4-  FF         ???
```

```
 03C5-  FF          ???
 03C6-  FF          ???
 03C7-  FF          ???
 03C8-  FF          ???
 03C9-  FF          ???
 03CA-  FF          ???
 03CB-  FF          ???
 03CC-  36 FF       ROL   $FF,X
 03CE-  FF          ???
 03CF-  FF          ???
 03D0-  4C BF 9D    JMP   $9DBF
 03D3-  4C 84 9D    JMP   $9D84
 03D6-  4C FD AA    JMP   $AAFD
 03D9-  4C B5 B7    JMP   $B7B5
 03DC-  AD 0F 9D    LDA   $9D0F
 03DF-  AC 0E 9D    LDY   $9D0E
 03E2-  60          RTS
 03E3-  AD C2 AA    LDA   $AAC2
 03E6-  AC C1 AA    LDY   $AAC1
 03E9-  60          RTS
*03EA-  4C 51 A8    JMP   $A851
*03ED-  EA          NOP
*03EE-  EA          NOP
*03EF-  4C 59 FA    JMP   $FA59
*03F2-  BF          ???
*03F3-  9D 38 4C    JMP   #FF58
*03F6-  58
*03F7-  FF
*03F8-  4C 65 FF    JMP   $FF65
*03FB-  4C 65 FF    JMP   $FF65
*03FE-  65 FF       ADC   $FF
```

FIRST RWTS PAGE (16K)

DOS VECTOR

DOS WARMSTART
DOS COLDSTART
FILE MANAGER (FIO)
READ/WRITE TRACK/SECTOR (RWTS)

} FIND FIO PARMLIST

} FIND RWTS PARMLIST

REPLACE DOS INTERCEPTS

[DOS WARMSTART]
RTS (FP & VECTOR)

MON (CTL-Y VECTOR)
MON (NMI VECTOR)
[MON] (IRQ VECTOR)

DOS 3.2 RELOCATER
($1B00-$1C7C)

DOS RELOCATER 3.2

```
1B00-  4C 84 1D     JMP   $1D84      GO TO DOS COLDSTART
1B03-  A9 BF        LDA   #$BF       ENTER FROM FINAL DOS BOOT (3747)
EPA 1B05-  85 41    STA   $41        40,41 → $BF00, LAST RAM PAGE
1B07-  A2 00        LDX   #$00
1B09-  86 40        STX   $40
1B0B-  A0 00        LDY   #$00       INIT TEST VAL TO 0
1B0D-  A1 40        LDA   ($40,X)    GET BYTE
1B0F-  85 26        STA   $26        SAVE
1B11-  98           TYA              A = TEST VALUE
1B12-  45 26        EOR   $26        RAM BYTE = TEST XOR RAM
1B14-  85 26        STA   $26
1B16-  98           TYA              GET TEST VAL AGAIN
1B17-  41 40        EOR   ($40,X)    RAM BYTE = TEST XOR RAM
1B19-  81 40        STA   ($40,X)    PUT BACK
1B1B-  C5 26        CMP   $26        SAME? RAM THERE?
1B1D-  D0 05        BNE   $1B24      NO, NO SUCH PAGE, NEXT UP
1B1F-  C8           INY              YES, MAKE SURE WITH ALL VALUES
1B20-  D0 EF        BNE   $1B11      CONTINUE
1B22-  F0 04        BEQ   $1B28      ALL IS WELL, 41 = LAST RAM PAGE
1B24-  C6 41        DEC   $41        NEXT PAGE
1B26-  D0 E3        BNE   $1B0B
1B28-  A5 41        LDA   $41        GET GOOD PAGE (3F,7F,BF) Y=0
1B2A-  29 DF        AND   #$DF       CONVERT TO (1F,5F,9F) (-8K)
1B2C-  85 43        STA   $43
1B2E-  86 42        STX   $42        42,43 = RAM FIRST ADDR
1B30-  A1 42        LDA   ($42,X)    GET BYTE AT TOP
1B32-  48           PHA              SAVE
1B33-  85 26        STA   $26        SAVE
1B35-  98           TYA              TEST VALUE
1B36-  45 26        EOR   $26
1B38-  85 26        STA   $26        RAM XOR TEST
1B3A-  98           TYA              TEST AGAIN
1B3B-  41 40        EOR   ($40,X)
1B3D-  81 42        STA   ($42,X)    RAM XOR TEST
1B3F-  C5 26        CMP   $26        SAME?
1B41-  D0 09        BNE   $1B4C      NO, BAD RAM
1B43-  C8           INY              YES SO FAR, NEXT TEST
1B44-  D0 EF        BNE   $1B35      CONTINUE
1B46-  A4 43        LDY   $43        ALL IS WELL, Y=1ST PAGE
1B48-  68           PLA              FIX STACK
1B49-  4C 51 1B     JMP   $1B51
1B4C-  68           PLA
1B4D-  81 42        STA   ($42,X)
1B4F-  A4 41        LDY   $41
1B51-  C8           INY              LAST RAM
1B52-  8C 79 1C     STY   $1C79      SAVE 1ST NON RAM
1B55-  38           SEC
1B56-  98           TYA
1B57-  ED 7A 1C     SBC   $1C7A      END - LEN DOS (23) = FIRST DOS PAGE
1B5A-  8D 78 1C     STA   $1C78      SAVE
1B5D-  38           SEC
1B5E-  ED 76 1C     SBC   $1C76      ALREADY AT 1D00
1B61-  F0 9D        BEQ   $1B00      (1D84) YES, NO RELOC NEEDED, COLDSTART, DONE
1B63-  8D 7B 1C     STA   $1C7B      RELOCATION VALUE
1B66-  AD 76 1C     LDA   $1C76      1D, CURRENT DOS START
1B69-  8D 0D 1D     STA   $1D0D      TO DOS EPA
1B6C-  A9 1D        LDA   #$1D
1B6E-  8D 49 37     STA   $3749      TO LOADER "JMP" TO ALLOW COLDSTART
1B71-  A9 84        LDA   #$84       SO BOOT → RELOC BECOMES
1B73-  8D 48 37     STA   $3748      BOOT TO xD84 (COLDSTART)
1B76-  A2 00        LDX   #$00       SET 40/41 BASE
```

FIND LAST RAM PAGE

```
1B78-  86 40      STX  $40        40,41 → INSTRUCTIONS
1B7A-  BD 29 1C   LDA  $1C29,X    GET LOW ADDR
1B7D-  A8         TAY             SAVE IN Y
1B7E-  BD 2A 1C   LDA  $1C2A,X    GET HI
1B81-  85 41      STA  $41        40,41 → HI#00
1B83-  4C 93 1B   JMP  $1B93      PROCESS 1ST BYTE IN RANGE
1B86-  18         CLC             FOR ADD
1B87-  B1 40      LDA  ($40),Y    GET ADDR HI
1B89-  6D 7B 1C   ADC  $1C7B      RELOCATE
1B8C-  91 40      STA  ($40),Y    REPLACE
1B8E-  C8         INY             TO LOW
1B8F-  D0 02      BNE  $1B93      MORE THIS PAGE
1B91-  E6 41      INC  $41        NEXT PAGE
1B93-  C8         INY             NEXT BYTE THIS PAGE (HI)
1B94-  D0 02      BNE  $1B98      MORE THIS PAGE
1B96-  E6 41      INC  $41        NEXT PAGE
1B98-  A5 41      LDA  $41        GET HI
1B9A-  DD 2C 1C   CMP  $1C2C,X    COMPARE TO RANGE END
1B9D-  90 E7      BCC  $1B86      < MORE TO DO
1B9F-  98         TYA             ≥ PAST
1BA0-  DD 2B 1C   CMP  $1C2B,X    CHECK LOW
1BA3-  90 E1      BCC  $1B86      < MORE TO DO
1BA5-  8A         TXA             ≥ GET TABLE INDEX
1BA6-  18         CLC
1BA7-  69 04      ADC  #$04       X=X+4, NEXT ENTRY
1BA9-  AA         TAX
1BAA-  EC 28 1C   CPX  $1C28      DONE (9 ENTRIES)?
1BAD-  90 CB      BCC  $1B7A      NO, NEXT TABLE ENTRY
1BAF-  A2 00      LDX  #$00       YES, NEXT TABLE
1BB1-  8E 9C 33   STX  $339C      SAVE INDEX
1BB4-  BD 5A 1C   LDA  $1C5A,X    } 40,41 → BEGIN OF RANGE
1BB7-  85 40      STA  $40
1BB9-  BD 5B 1C   LDA  $1C5B,X
1BBC-  85 41      STA  $41
1BBE-  A2 00      LDX  #$00       FOR INDEXING
1BC0-  A1 40      LDA  ($40,X)    OPCODE
1BC2-  20 8E F8   JSR  $F88E      INSDS2, GET INSTRUCTION LENG-1
1BC5-  A4 2F      LDY  $2F        LENGTH (-1)
1BC7-  C0 02      CPY  #$02       3-BYTE?
1BC9-  D0 11      BNE  $1BDC      NO
1BCB-  B1 40      LDA  ($40),Y    YES, GET HI PART OF ABS ADDR
1BCD-  CD 76 1C   CMP  $1C76      BEFORE DOS
1BD0-  90 0A      BCC  $1BDC      YES, IGNORE
1BD2-  CD 77 1C   CMP  $1C77      AFTER DOS
1BD5-  B0 05      BCS  $1BDC      YES, IGNORE
1BD7-  6D 7B 1C   ADC  $1C7B      NO, RELOCATE
1BDA-  91 40      STA  ($40),Y    RESTORE
1BDC-  38         SEC             +1 FOR LENGTH
1BDD-  A5 2F      LDA  $2F        LENGTH -1
1BDF-  65 40      ADC  $40        } NEXT INSTRUCTION
1BE1-  85 40      STA  $40
1BE3-  A9 00      LDA  #$00
1BE5-  65 41      ADC  $41
1BE7-  85 41      STA  $41
1BE9-  AE 9C 33   LDX  $339C      REGET INDEX
1BEC-  DD 5D 1C   CMP  $1C5D,X    END RANGE
1BEF-  90 CD      BCC  $1BBE      NO
1BF1-  A5 40      LDA  $40        REALLY?
1BF3-  DD 5C 1C   CMP  $1C5C,X
1BF6-  90 C6      BCC  $1BBE      NO
1BF8-  8A         TXA             YES
1BF9-  18         CLC
1BFA-  69 04      ADC  #$04       X=X+4, NEXT TABLE ENTRY
```

RELOCATE ALL ADDRESS CONSTANTS

RELOCATE ALL CODE

```
1BFC-  AA          TAX
1BFD-  EC 59 1C    CPX   $1C59
1C00-  90 AF       BCC   $1BB1
1C02-  A9 3F       LDA   #$3F
1C04-  85 41       STA   $41
1C06-  AC 79 1C    LDY   $1C79
1C09-  88          DEY
1C0A-  84 43       STY   $43
1C0C-  A9 00       LDA   #$00
1C0E-  85 40       STA   $40
1C10-  85 42       STA   $42
1C12-  A8          TAY
1C13-  B1 40       LDA   ($40),Y
1C15-  91 42       STA   ($42),Y
1C17-  C8          INY
1C18-  D0 F9       BNE   $1C13
1C1A-  CE 7C 1C    DEC   $1C7C
1C1D-  F0 06       BEQ   $1C25
1C1F-  C6 41       DEC   $41
1C21-  C6 43       DEC   $43
1C23-  D0 EE       BNE   $1C13
1C25-  4C 54 1E    JMP   $1E54
1C28-  24 00       BIT   $00
1C2A-  1D 56 1D    ORA   $1D56,X
1C2D-  58          CLI
1C2E-  1D 5A 1D    ORA   $1D5A,X
1C31-  64          ???
1C32-  1D 66 1D    ORA   $1D66,X
1C35-  6C 1D 70    JMP   ($701D)
1C38-  1D 78 1D    ORA   $1D78,X
1C3B-  7C          ???
1C3C-  1D 7E 1D    ORA   $1D7E,X
1C3F-  80          ???
1C40-  1D C1 2A    ORA   $2AC1,X
1C43-  FD 2A E4    SBC   $E42A,X
1C46-  37          ???
1C47-  E8          INX
1C48-  37          ???
1C49-  EE 37 F0    INC   $F037
1C4C-  37          ???
1C4D-  00          BRK
1C4E-  00          BRK
1C4F-  00          BRK
1C50-  00          BRK
1C51-  00          BRK
1C52-  00          BRK
1C53-  00          BRK
1C54-  00          BRK
1C55-  00          BRK
1C56-  00          BRK
1C57-  00          BRK
1C58-  00          BRK
1C59-  18          CLC
1C5A-  84 1D       STY   $1D
1C5C-  84 28       STY   $28
1C5E-  FD 2A 97    SBC   $972A,X
1C61-  33          ???
1C62-  00          BRK
1C63-  37          ???
1C64-  E0 37       CPX   #$37
1C66-  FE 35 FE    INC   $FE35,X
1C69-  35 00       AND   $00,X
1C6B-  38          SEC
```

DONE (6 ENTRIES)
NO
YES, LAST DOS
- 40,41 → 3F00 END SOURCE
- 42,43 → BF00 END TARGET

COPY RELOCATED VERSION TO TOP OF RAM

GO TO COLDSTART (BEB IMAGE)

ADDR RELOC TABLE

1D00, 1D56
1D58, 1D5A
1D64, 1D66
1D6C, 1D70
1D78, 1D7C
1D7E, 1D80
2AC1, 2AFD
37E4, 37E8
37EE, 37F0
START, END

Bytes within START, END ranges treated as address constants to be relocated

1D84, 2884
2AFD, 3397
3700, 37E0
35FE, 35FE
3800, 384F
3D00, 3FFF

CODE RELOC TABLE

1D84, 2884
2AFD, 3397
365D, 37E0
3C56, 3CDF
3800, 3A11
3D00, 3FA8
3FC8, 3FFF

```
1C6C-   8F          ???
1C6D-   3A          ???
1C6E-   00          BRK
1C6F-   3D FF 3F    AND   $3FFF,X
1C72-   00          BRK
1C73-   00          BRK
1C74-   00          BRK
1C75-   00          BRK
1C76-   1D 40 9D    ORA   $9D40,X
1C79-   C0 23       CPY   #$23
1C7B-   80          ???
1C7C-   00          BRK
```

DATA

1C76: LOWEST DOS
1C77: HIGHEST DOS
1C78: FIRST DOS PAGE
1C79: FIRST NON-RAM PAGE
1C7A: 35, LENGTH OF DOS IN PAGES
1C7B: RELOCATION VALUE
1C7C: COPY INDEX

DOS 3.2

(xD00-yFFF)

x=	$1D	y=	$3F	(16K)
	$3D		$5F	(24K)
	$5D		$7F	(32K)
	$7D		$9F	(40K)
	$9D		$BF	(48K)

PRELIMINARY DOS 3.2 MAP (48K)

9D00 – 9D83: START DOS, TABLES
9D84 – 9DBE: COLDSTART
9DBF – 9DE9: WARMSTART
9DEA – 9E50: ENTRY PROCESSING
9E51 – 9E80: PAGE 3 $3D0 VECTOR IMAGE
9E81 – 9FC7: KEYBOARD/VIDEO INTERCEPTS
9FC8 – A192: DOS COMMAND PARSING/PROCESSING
A193 – A228: MISC. UTILITY ROUTINES
A229 – A60D: COMMAND HANDLING
A60E – A719: MISC. UTILITY ROUTINES
A71A – A850: BUFFER MANAGEMENT
A851 – A883: SET DOS CSWL/KSWL INTERCEPTS
A884 – A970: COMMAND/KEYWORD TABLES
A971 – AA4E: MESSAGES
AA4F – AA74: CONSTANTS, WORKAREAS
AA75 – AAB0: FILE NAME BUFFERS
AAB1 – AAC8: WORKAREA
AAC9 – B3BA: FIO, CMDS, PROCESSING
B3BB – B4BA: VTOC BUFFER
B4BB – B5BA: CATALOG BUFFER
B5BB – B5FF: FIO PARMS, WORKAREA
B600 – B6FF: TRACK 0/SECTOR 0 PAGE 3 BOOT IMAGE
B700 – B7B4: DOS BOOT PHASE 3
B7B5 – BFFF: RWTS, BUFFERS, TABLES

DOS 3.2

```
9D00-  D3          ???
9D01-  9C          ???
9D02-  81 9E       STA   ($9E,X)
9D04-  BD 9E 75    LDA   $759E,X
9D07-  AA          TAX
9D08-  93          ???
9D09-  AA          TAX
9D0A-  60          RTS
9D0B-  AA          TAX
9D0C-  00          BRK
9D0D-  9D BB B5    STA   $B5BB,X
9D10-  EA          NOP
9D11-  9E          ???
9D12-  11 9F       ORA   ($9F),Y
9D14-  22          ???
9D15-  9F          ???
9D16-  2E 9F 51    ROL   $519F
9D19-  9F          ???
9D1A-  60          RTS
9D1B-  9F          ???
9D1C-  70 9F       BVS   $9CBD
9D1E-  4E A5 12    LSR   $12A5
9D21-  A4 96       LDY   $96
9D23-  A3          ???
9D24-  D0 A4       BNE   $9CCA
9D26-  EF          ???
9D27-  A4 62       LDY   $62
9D29-  A2 70       LDX   #$70
9D2B-  A2 74       LDX   #$74
9D2D-  A2 E9       LDX   #$E9
9D2F-  A2 1A       LDX   #$1A
9D31-  A5 C5       LDA   $C5
9D33-  A5 0F       LDA   $0F
9D35-  A5 DC       LDA   $DC
9D37-  A5 A2       LDA   $A2
9D39-  A2 97       LDX   #$97
9D3B-  A2 80       LDX   #$80
9D3D-  A2 6D       LDX   #$6D
9D3F-  A5 32       LDA   $32
9D41-  A2 3C       LDX   #$3C
9D43-  A2 28       LDX   #$28
9D45-  A2 2D       LDX   #$2D
9D47-  A2 50       LDX   #$50
9D49-  A2 79       LDX   #$79
9D4B-  A5 9D       LDA   $9D
9D4D-  A5 30       LDA   $30
9D4F-  A3          ???
9D50-  5C          ???
9D51-  A3          ???
9D52-  8D A3 7C    STA   $7CA3
9D55-  A2 36       LDX   #$36
9D57-  E8          INX
9D58-  E5 A4       SBC   $A4
9D5A-  E3          ???
9D5B-  E3          ???
9D5C-  00          BRK
9D5D-  E0 03       CPX   #$03
* 9D5F-  E0 00     CPX   #$00
* 9D61-  00        BRK
9D62-  36 E8       ROL   $E8,X
```

9D00: FIRST BUFFER LINK ↑

9D02: DOS KBD INTERCEPT EP

9D04: DOS VID INTERCEPT EP

9D06: PRIMARY FILE NAME ↑

9D08: SECONDARY FILE NAME ↑

9D0A: ↑ RANGE LENGTH

9D0C: DOS LOAD POINT (1B00, 1D00, xD0

9D0E: FIO PARMLIST LOCATION

DOS CSWL INTERCEPT STATE HANDLER TABLE

STATE	EPA
0	9EEB
1	9F12
2	9F23
3	9F2F
4	9F52
5	9F61
6	9F71

COMMAND HANDLER EPA TABLE

+00		
00	INIT	A54F
02	LOAD	A413
04	SAVE	A397
06	RUN	A4D1
08	CHAIN	A4F0
0A	DELETE	A263
0C	LOCK	A271
0E	UNLOCK	A275
10	CLOSE	A2EA
12	READ	A51B
14	EXEC	A5C6
16	WRITE	A510
18	POSITION	A5DD
1A	OPEN	A2A3
1C	APPEND	A298
1E	RENAME	A281
20	CATALOG	A56E
22	MON	A233
24	NOMON	A23D
26	PR#	A229
28	IN#	A22E
2A	MAXFILES	A251
2C	FP	A57A
2E	INT	A59E
30	BSAVE	A331
32	BLOAD	A35D
34	BRUN	A38E
36	VERIFY	A27D

ACTIVE BASIC ENTRY POINT VECTOR

+0 CHAIN
+2 RUN
+4 ERROR EPA
+6 COLDSTART
+8 WARMSTART
+A RELOCATE PGM (FP ONLY)

```
9D64-   E5 A4       SBC   $A4
9D66-   E3          ???
9D67-   E3          ???
9D68-   00          BRK
9D69-   E0 03       CPX   #$03
9D6B-   E0 FC       CPX   #$FC
9D6D-   A4 FC       LDY   $FC
9D6F-   A4 65       LDY   $65
9D71-   D8          CLD
9D72-   00          BRK
9D73-   E0 3C       CPX   #$3C
9D75-   D4          ???
9D76-   F2          ???
9D77-   D4          ???
9D78-   06 A5       ASL   $A5
9D7A-   06 A5       ASL   $A5
9D7C-   67          ???
9D7D-   10 84       BPL   $9D03
9D7F-   9D 3C 0C    STA   $0C3C,X
9D82-   F2          ???
9D83-   0C          ???
9D84-   AD E9 B7    LDA   $B7E9
9D87-   4A          LSR
9D88-   4A          LSR
9D89-   4A          LSR
9D8A-   4A          LSR
9D8B-   8D 6A AA    STA   $AA6A
9D8E-   AD EA B7    LDA   $B7EA
9D91-   8D 68 AA    STA   $AA68
9D94-   AD 00 E0    LDA   $E000
9D97-   49 20       EOR   #$20
9D99-   D0 11       BNE   $9DAC
9D9B-   8D B6 AA    STA   $AAB6
9D9E-   A2 0A       LDX   #$0A
9DA0-   BD 61 9D    LDA   $9D61,X
9DA3-   9D 55 9D    STA   $9D55,X
9DA6-   CA          DEX
9DA7-   D0 F7       BNE   $9DA0
9DA9-   4C BC 9D    JMP   $9DBC
9DAC-   A9 40       LDA   #$40
9DAE-   8D B6 AA    STA   $AAB6
*9DB1-  A2 0C       LDX   #$0C
9DB3-   BD 6B 9D    LDA   $9D6B,X
9DB6-   9D 55 9D    STA   $9D55,X
9DB9-   CA          DEX
9DBA-   D0 F7       BNE   $9DB3
9DBC-   38          SEC
9DBD-   B0 12       BCS   $9DD1
*9DBF-  AD B6 AA    LDA   $AAB6
*9DC2-  D0 04       BNE   $9DC8
**9DC4- A9 20       LDA   #$20
**9DC6- D0 05       BNE   $9DCD
**9DC8- 0A          ASL
**9DC9- 10 05       BPL   $9DD0
**9DCB- A9 4C       LDA   #$4C
*9DCD-  20 B2 A5    JSR   $A5B2
9DD0-   18          CLC
9DD1-   08          PHP
9DD2-   20 51 A8    JSR   $A851
9DD5-   A9 00       LDA   #$00
*9DD7-  8D 5E AA    STA   $AA5E
9DDA-   8D 52 AA    STA   $AA52
9DDD-   28          PLP
```

INT BASIC EPA IMAGE

FP ROM BASIC EPA IMAGE

FP RAM BASIC EPA IMAGE

GET SLOT*16

/16

SAVE SLOT #

SAVE DRIVE #

IS APPLESOFT ROM ACTIVE?

REMEMBER TYPE

COPY (INT) BASIC EPA'S TO ACTIVE BASIC ENTRY POINT VECTOR

REMEMBER TYPE

COPY (FP ROM) BASIC EPA'S to Active BASIC ENTRY POINT VECTOR

DOS COLDSTART

DOS WARMSTART

GET BASIC TYPE
NOT INT?

(INT) ROM NEEDED

IF RAM FP, DON'T FOOL WITH ROM CARD

(FP) ROM NEEDED

GO SET APPROPRIATE ROM

REMEMBER COLD OR WARM ENTRY
REPLACE DOS KBD/VID INTERCEPTS

NOMON C,I,O

STATE=Ø

COLD OR WARM?

```
9DDE-   6A          ROR                 ØØ - WARM  8Ø - COLD
9DDF-   8D 51 AA    STA   $AA51        SET ENTRY VALUE
9DE2-   30 03       BMI   $9DE7
9DE4-   6C 5E 9D    JMP   ($9D5E)      WARMSTART > PROPER BASIC
9DE7-   6C 5C 9D    JMP   ($9D5C)      COLDSTART >
9DEA-   0A          ASL                                  FIRST ENTRY PROC
9DEB-   10 19       BPL   $9E06        IN RAM FP?
9DED-   8D B6 AA    STA   $AAB6        SAY FP RAM (8Ø) ACTIVE
*9DF0-  A2 0C       LDX   #$0C
9DF2-   BD 77 9D    LDA   $9D77,X
9DF5-   9D 55 9D    STA   $9D55,X      COPY ITS EPA's TO ACTIVE BASIC
9DF8-   CA          DEX                VECTOR
9DF9-   D0 F7       BNE   $9DF2
9DFB-   A2 1D       LDX   #$1D
9DFD-   BD 93 AA    LDA   $AA93,X
9E00-   9D 75 AA    STA   $AA75,X      BLANK OUT GREETING FILE NAME
9E03-   CA          DEX                (CAN'T HAVE ONE WITH RAM FP)
9E04-   10 F7       BPL   $9DFD
9E06-   AD B1 AA    LDA   $AAB1        SET MAXFILES TO DEFAULT
9E09-   8D 57 AA    STA   $AA57          VALUE (3)
9E0C-   20 D4 A7    JSR   $A7D4        GO DO BUFFER INITIALIZATION
9E0F-   AD B3 AA    LDA   $AAB3        EXEC ACTIVE?
9E12-   F0 09       BEQ   $9E1D        YES...
9E14-   48          PHA                [$4Ø] → EXEC FILE
9E15-   20 9D A6    JSR   $A69D
9E18-   68          PLA
9E19-   A0 00       LDY   #$00         CLOSE EXEC FILE
9E1B-   91 40       STA   ($40),Y
9E1D-   20 5B A7    JSR   $A75B        STATE=Ø/WARMSTART STATUS
9E20-   AD 5F AA    LDA   $AA5F        ANY CMDS PARSED YET?
9E23-   D0 20       BNE   $9E45
*9E25-  A2 2F       LDX   #$2F
9E27-   BD 51 9E    LDA   $9E51,X      COPY DOS VECTOR TO $3DØ
9E2A-   9D D0 03    STA   $03D0,X
9E2D-   CA          DEX
9E2E-   10 F7       BPL   $9E27
*9E30-  AD 53 9E    LDA   $9E53
*9E33-  8D F3 03    STA   $03F3        $3F2, $3F3 = DOS WARMSTART ↑
*9E36-  49 A5       EOR   #$A5
*9E38-  8D F4 03    STA   $03F4        $3F4 = "9D" XOR "A5" = "38"
*9E3B-  AD 52 9E    LDA   $9E52
*9E3E-  8D F2 03    STA   $03F2
*9E41-  A9 06       LDA   #$06         "RUN" COMMAND FOR GREETING FILE
*9E43-  D0 05       BNE   $9E4A
9E45-   AD 62 AA    LDA   $AA62        GET PENDING COMMAND (IF ANY)
9E48-   F0 06       BEQ   $9E50        NONE?
9E4A-   8D 5F AA    STA   $AA5F        SET COMMAND TO DO
*9E4D-  4C 80 A1    JMP   $A180        GO DO IT
*9E50-  60          RTS
9E51-3DØ 4C BF 9D   JMP   $9DBF        DOS WARMSTART
9E54-3D3 4C 84 9D   JMP   $9D84        DOS COLDSTART
9E57-3D6 4C FD AA   JMP   $AAFD        FILE MGR (FIO)
9E5A-3D9 4C B5 B7   JMP   $B7B5        RWTS
9E5D-3DC AD 0F 9D   LDA   $9D0F
9E60-   AC 0E 9D    LDY   $9D0E        FIND FIO PARMLIST
9E63-   60          RTS
9E64-3E3 AD C2 AA   LDA   $AAC2
9E67-   AC C1 AA    LDY   $AAC1        FIND RWTS PARMLIST
9E6A-   60          RTS
9E6B-3EA 4C 51 A8   JMP   $A851        REPLACE DOS INTERCEPTS
9E6E-   EA          NOP
9E6F-   EA          NOP
9E70-3EF 4C 59 FA   JMP   $FA59        AUTOSTART ROM BREAK HANDLER
```

IMAGE OF DOS VECTOR MOVED TO $3DØ

```
9E73-3F2 4C 65 FF    JMP   $FF65    MON   (AUTOSTART ROM POWER UP)
9E76-3F5 4C 58 FF    JMP   $FF58    RTS   (FP & LOCATION)
9E79-3F8 4C 65 FF    JMP   $FF65    MON   (CTL-Y VECTOR)
9E7C-3FB 4C 65 FF    JMP   $FF65    MON   (NMI VECTOR)
9E7F-3FE 65 FF       ADC   $FF      (MON) (IRQ VECTOR)
```

DOS KBD INTER.

```
 9E81-    20 D1 9E    JSR   $9ED1    SAVE REGS
 9E84-    AD 51 AA    LDA   $AA51    ENTRY VALUE
 9E87-    F0 15       BEQ   $9E9E    WARM?
*9E89-    48          PHA
 9E8A-    AD 5C AA    LDA   $AA5C    GET ACC CONTENTS
 9E8D-    91 28       STA   ($28),Y  ECHO IT (ERASE CURSOR)
*9E8F-    68          PLA
 9E90-    30 03       BMI   $9E95    NOW COLDSTART IF WANTED
 9E92-    4C 26 A6    JMP   $A626    IN READ STATE, GET DISK DATA
*9E95-    20 EA 9D    JSR   $9DEA    DO FIRST TIME PROCESSING
 9E98-    A4 24       LDY   $24      CH
 9E9A-    A9 60       LDA   #$60     FLASHING BLANK (CURSOR)
 9E9C-    91 28       STA   ($28),Y  PUT ON SCREEN
 9E9E-    AD B3 AA    LDA   $AAB3    EXECing?
 9EA1-    F0 03       BEQ   $9EA6
 9EA3-    20 82 A6    JSR   $A682    , YES, GET A BYTE FROM EXEC FILE
 9EA6-    A9 03       LDA   #$03     STATE=3
 9EA8-    8D 52 AA    STA   $AA52
 9EAB-    20 BA 9F    JSR   $9FBA    RESTORE ORIG. REGS
 9EAE-    20 BA 9E    JSR   $9EBA    GO TO TRUE KBD INPUT
 9EB1-    8D 5C AA    STA   $AA5C    SAVE INPUT CHARACTER
 9EB4-    8E 5A AA    STX   $AA5A    AND NEW X REG
 9EB7-    4C B3 9F    JMP   $9FB3    AND EXIT
 9EBA-    6C 38 00    JMP   ($0038)  TRUE KSWL
```

DOS VID INTER.

```
 9EBD-    20 D1 9E    JSR   $9ED1    SAVE REGS
 9EC0-    AD 52 AA    LDA   $AA52    GET STATE
 9EC3-    0A          ASL            *2 FOR TABLE IDX
 9EC4-    AA          TAX
 9EC5-    BD 11 9D    LDA   $9D11,X  } FIND THIS STATE'S HANDLER ROUTINE
 9EC8-    48          PHA
 9EC9-    BD 10 9D    LDA   $9D10,X  }
 9ECC-    48          PHA
 9ECD-    AD 5C AA    LDA   $AA5C    GET OUTPUTTED CHARACTER
 9ED0-    60          RTS            GO TO STATE HANDLER
```

COMMON INTERCEPT HANDLING

```
 9ED1-    8D 5C AA    STA   $AA5C    }
 9ED4-    8E 5A AA    STX   $AA5A    }
 9ED7-    8C 5B AA    STY   $AA5B    } SAVE A,X,Y,S REGS
 9EDA-    BA          TSX            }
 9EDB-    E8          INX            }
 9EDC-    E8          INX            }
 9EDD-    8E 59 AA    STX   $AA59    }
 9EE0-    A2 03       LDX   #$03     }
 9EE2-    BD 53 AA    LDA   $AA53,X  } RESTORE TRUE I/O HANDLERS WHILE
 9EE5-    95 36       STA   $36,X    } IN DOS
 9EE7-    CA          DEX            }
 9EE8-    10 F8       BPL   $9EE2    }
 9EEA-    60          RTS
```

STATE #Ø

START OF LINE

```
*9EEB-    AE B7 AA    LDX   $AAB7    RUN INTERRUPTED?
*9EEE-    F0 03       BEQ   $9EF3
*9EF0-    4C 78 9F    JMP   $9F78    IF SO, GO COMPLETE IT
 9EF3-    AE 51 AA    LDX   $AA51    READING?
 9EF6-    F0 08       BEQ   $9F00
 9EF8-    C9 BF       CMP   #$BF     OUTPUTTING A "?" (BASIC INPUT STMNT)
 9EFA-    F0 75       BEQ   $9F71    YES, STATE=6 (SKIP THIS CHARACTER)
 9EFC-    C5 33       CMP   $33      ELSE IS IT A PROMPT?
*9EFE-    F0 27       BEQ   $9F27    YES, STATE=2 (IGNORE LINE)
 9F00-    A2 02       LDX   #$02     STATE=2
 9F02-    8E 52 AA    STX   $AA52
```

```
9F05-  CD B2 AA    CMP   $AAB2   CTL-D?
9F08-  D0 19       BNE   $9F23   NO, STATE 2 NOW (IGNORE LINE)
9F0A-  CA          DEX            } STATE=1 (COLLECT DOS COMMAND LINE)
9F0B-  8E 52 AA    STX   $AA52    }
9F0E-  CA          DEX            } FIRST CHARACTER OF LINE
9F0F-  8E 5D AA    STX   $AA5D    }
-------------------------------------------------------------------------
9F12-  AE 5D AA    LDX   $AA5D   GET POSITION                    STATE #1
9F15-  9D 00 02    STA   $0200,X UPDATE INPUT BUFFER             (DOS CMD
9F18-  E8          INX            } NEXT POSITION                 COLLECT)
9F19-  8E 5D AA    STX   $AA5D    }
9F1C-  C9 8D       CMP   #$8D    RETURN CHAR?
9F1E-  D0 75       BNE   $9F95   NO, GO OUT VIA ECHO
9F20-  4C CD 9F    JMP   $9FCD   YES, TIME TO SCAN IT FOR A DOS CMD
-------------------------------------------------------------------------
9F23-  C9 8D       CMP   #$8D    RETURN?                         STATE #2
9F25-  D0 7D       BNE   $9FA4   NOT YET, ECHO                   (NON-DOS
9F27-  A2 00       LDX   #$00    ELSE, BACK TO STATE Ø            CMD IGNORE)
9F29-  8E 52 AA    STX   $AA52
9F2C-  4C A4 9F    JMP   $9FA4   ECHO AND EXIT
-------------------------------------------------------------------------
9F2F-  A2 00       LDX   #$00    } STATE = Ø IF INPUT ENDS        STATE #3
9F31-  8E 52 AA    STX   $AA52   }                               (INPUT
9F34-  C9 8D       CMP   #$8D    RETURN?                          ECHO)
9F36-  F0 07       BEQ   $9F3F
9F38-  AD B3 AA    LDA   $AAB3   EXECING?
9F3B-  F0 67       BEQ   $9FA4   NO, ECHO UNCONDITIONALLY } (KSWL WILL SET
9F3D-  D0 5E       BNE   $9F9D   YES, ECHO IF "MON I" SET } (STATE=3.
9F3F-  48          PHA
9F40-  38          SEC           (IF EXECING ALWAYS COLLECT DOS CMD)
9F41-  AD B3 AA    LDA   $AAB3   EXECING?
9F44-  D0 03       BNE   $9F49   YES
9F46-  20 5E A6    JSR   $A65E   NO, BASIC EXECUTING?
9F49-  68          PLA
9F4A-  90 EC       BCC   $9F38   INPUT STMNT - DON'T COLLECT DOS CMD
9F4C-  AE 5A AA    LDX   $AA5A   } IF BASIC IMMEDIATE OR EXECING, COLLECT
9F4F-  4C 15 9F    JMP   $9F15   }
-------------------------------------------------------------------------
9F52-  C9 8D       CMP   #$8D    RETURN?                         STATE #4
9F54-  D0 05       BNE   $9F5B   NO                              (WRITE
9F56-  A9 05       LDA   #$05    } ELSE, STATE 5 NEXT             MODE)
9F58-  8D 52 AA    STA   $AA52   }
9F5B-  20 0E A6    JSR   $A60E   WRITE THE BYTE
9F5E-  4C 99 9F    JMP   $9F99   ECHO AND OUT
-------------------------------------------------------------------------
9F61-  CD B2 AA    CMP   $AAB2   CTL-D?                          STATE #5
9F64-  F0 85       BEQ   $9EEB   YES, EXIT WRITE MODE            (WRITE MODE
9F66-  C9 8A       CMP   #$8A    LINE FEED?                       LINE START)
9F68-  F0 F1       BEQ   $9F5B   YES, STAY IN STATE 5
9F6A-  A2 04       LDX   #$04    STATE=4 FOR REMAINDER
9F6C-  8E 52 AA    STX   $AA52
9F6F-  D0 E1       BNE   $9F52
-------------------------------------------------------------------------
9F71-  A9 00       LDA   #$00    START OF LINE (STATE=Ø)         STATE #6
9F73-  8D 52 AA    STA   $AA52                                   (SKIP PROMPT
9F76-  F0 25       BEQ   $9F9D   ECHO AND OUT                     CHARACTER)
-------------------------------------------------------------------------
*9F78-  A9 00      LDA   #$00    } RESET FLAG
*9F7A-  8D B7 AA   STA   $AAB7   }
*9F7D-  20 51 A8   JSR   $A851   SET DOS INTERCEPTS
*9F80-  4C DC A4   JMP   $A4DC   GO FINISH "RUN"
-------------------------------------------------------------------------
9F83-  AD 00 02    LDA   $0200   GET FIRST CHAR OF CMD           DOS COMND
9F86-  CD B2 AA    CMP   $AAB2   CTL-D?                          SCAN EXIT
9F89-  F0 0A       BEQ   $9F95   YES, DON'T TOUCH IT
*9F8B-  A9 8D      LDA   #$8D    } NULL LINE SO BASIC WON'T SAY "SYNTAX ERR
 9F8D-  8D 00 02   STA   $0200   }
 9F90-  A2 00      LDX   #$00    } ZERO LENGTH INPUT INDEX (X REG)
 9F92-  8E 5A AA   STX   $AA5A   }
-------------------------------------------------------------------------
9F95-→ A9 40       LDA   #$40    } ECHO IF MON C                 ECHO AND
 9F97-  D0 06      BNE   $9F9F   }                               EXIT
```

```
9F99-  A9 10      LDA   #$10     } ECHO IF MON O
9F9B-  D0 02      BNE   $9F9F
9F9D-  A9 20      LDA   #$20     } ECHO IF MON I
9F9F-  2D 5E AA   AND   $AA5E
9FA2-  F0 0F      BEQ   $9FB3
9FA4-  20 BA 9F   JSR   $9FBA    RESTORE REGS
9FA7-  20 C5 9F   JSR   $9FC5    ECHO CHARACTER
9FAA-  8D 5C AA   STA   $AA5C    }
9FAD-  8C 5B AA   STY   $AA5B    } SAVE REGS AFTER CSWL
9FB0-  8E 5A AA   STX   $AA5A    }
9FB3-  20 51 A8   JSR   $A851    PUT BACK INTERCEPTS        DOS EXIT
9FB6-  AE 59 AA   LDX   $AA59    RESTORE STACK
9FB9-  9A         TXS
9FBA-  AD 5C AA   LDA   $AA5C                               RESTORE REGS
9FBD-  AC 5B AA   LDY   $AA5B    RESTORE A,Y & X
9FC0-  AE 5A AA   LDX   $AA5A
9FC3-  38         SEC
9FC4-  60         RTS
9FC5-  6C 36 00   JMP   ($0036)      TRUE CSWL
9FC8-  A9 8D      LDA   #$8D     CR                          SKIP A LINE
9FCA-  4C C5 9F   JMP   $9FC5    PUT IT
9FCD-  A0 FF      LDY   #$FF     } INITIALIZE CMD NUMBER      COMMAND PARSE
9FCF-  8C 5F AA   STY   $AA5F    }
9FD2-  C8         INY            } NO PENDING COMMAND
9FD3-  8C 62 AA   STY   $AA62    }
9FD6-  EE 5F AA   INC   $AA5F    CMD NUMBER = CMD NUMBER+1
9FD9-  A2 00      LDX   #$00     } ZERO FLAG CLEAR/X=Ø
9FDB-  08         PHP            }
9FDC-  BD 00 02   LDA   $0200,X  GET FIRST CHARACTER
9FDF-  CD B2 AA   CMP   $AAB2    CTL-D?
9FE2-  D0 01      BNE   $9FE5    } IF SO, SKIP OVER IT
9FE4-  E8         INX            }
9FE5-  8E 5D AA   STX   $AA5D    START-OF-COMMAND INDEX
9FE8-  20 A4 A1   JSR   $A1A4    FLUSH TO NEXT NON-BLANK
9FEB-  29 7F      AND   #$7F     MSB OFF
9FED-  59 84 A8   EOR   $A884,Y  COMPARE TO COMMAND TEXT TABLE
9FF0-  C8         INY
9FF1-  0A         ASL            IGNORE MISMATCHING MSB/C=END
9FF2-  F0 02      BEQ   $9FF6
9FF4-  68         PLA            REMEMBER MISMATCHS
9FF5-  08         PHP
9FF6-  90 F0      BCC   $9FE8    END OF COMMAND?
9FF8-  28         PLP            } WELL, DID IT MATCH?
9FF9-  F0 20      BEQ   $A01B
9FFB-  B9 84 A8   LDA   $A884,Y  } MORE NAMES IN TABLE?
9FFE-  D0 D6      BNE   $9FD6
A000-  AD 00 02   LDA   $0200
A003-  CD B2 AA   CMP   $AAB2    CTL-D?
A006-  F0 03      BEQ   $A00B
A008-  4C A4 9F   JMP   $9FA4    NOT DOS CMD, LEAVE IT ALONE
A00B-  AD 01 02   LDA   $0201    NULL DOS CMD?
A00E-  C9 8D      CMP   #$8D
A010-  D0 06      BNE   $A018    IF NOT, SYNTAX ERROR
A012-  20 5B A7   JSR   $A75B    RESET STATE/WARMSTART
A015-  4C 95 9F   JMP   $9F95    ECHO COMMAND AND EXIT
A018-  4C C4 A6   JMP   $A6C4    "COMMAND SYNTAX ERROR"
A01B-  0E 5F AA   ASL   $AA5F    CMDNUM*2
A01E-  AC 5F AA   LDY   $AA5F    INDEX TO OPERAND TABLE
*A021-  20 5E A6   JSR   $A65E    BASIC PGM EXECUTING?
*A024-  90 0C      BCC   $A032    YES
*A026-  A9 02      LDA   #$02     } DEFERRED COMMAND?
*A028-  39 09 A9   AND   $A909,Y  }
*A02B-  F0 05      BEQ   $A032    NO
```

COMMAND NAME LOOKUP

```
*A02D-  A9 0F      LDA  #$0F   } "NOT DIRECT COMMAND"
*A02F-  4C D2 A6   JMP  $A6D2  }
*A032-  C0 06      CPY  #$06   RUN?
*A034-  D0 02      BNE  $A038
*A036-  84 33      STY  $33    MAKE PROMPT NON PRINTING
 A038-  A9 20      LDA  #$20
 A03A-  39 09 A9   AND  $A909,Y } FILENAME #1?
 A03D-  F0 61      BEQ  $A0A0
 A03F-  20 95 A0   JSR  $A095  CLEAR FILENAME BUFFER
 A042-  08         PHP         (EQ)
 A043-  20 A4 A1   JSR  $A1A4  GET NEXT NON-BLANK
 A046-  F0 1E      BEQ  $A066  END?
 A048-  0A         ASL
 A049-  90 05      BCC  $A050  } IF FLASHING, NO GOOD
 A04B-  30 03      BMI  $A050  }
 A04D-  4C 00 A0   JMP  $A000  }
 A050-  6A         ROR
 A051-  4C 59 A0   JMP  $A059
 A054-  20 93 A1   JSR  $A193  <- NEXT INPUT CHAR
 A057-  F0 0D      BEQ  $A066  END?
 A059-  99 75 AA   STA  $AA75,Y  MOVE CHAR TO FILENAME BUFF
 A05C-  C8         INY         NEXT
 A05D-  C0 3C      CPY  #$3C
 A05F-  90 F3      BCC  $A054
 A061-  20 93 A1   JSR  $A193  } FLUSH EXCESS FILENAME TO "b"
 A064-  D0 FB      BNE  $A061  }
 A066-  28         PLP         } FINISHED BOTH NAMES?
 A067-  D0 0F      BNE  $A078  }
 A069-  AC 5F AA   LDY  $AA5F  } FILENAME #2?
 A06C-  A9 10      LDA  #$10   }
 A06E-  39 09 A9   AND  $A909,Y }
 A071-  F0 0C      BEQ  $A07F  }
 A073-  A0 1E      LDY  #$1E   DISPLACEMENT TO IT
 A075-  08         PHP         (NE)
 A076-  D0 CB      BNE  $A043  PARSE IT
 A078-  AD 93 AA   LDA  $AA93  } FILENAME #2 = b? (IF REQUIRED, "SYNTAX ERR")
 A07B-  C9 A0      CMP  #$A0   }
 A07D-  F0 13      BEQ  $A092  }
 A07F-  AD 75 AA   LDA  $AA75  } FILENAME #1 = b?
 A082-  C9 A0      CMP  #$A0   }
 A084-  D0 4B      BNE  $A0D1  }
 A086-  AC 5F AA   LDY  $AA5F  } FILENAME OPTIONAL?
 A089-  A9 C0      LDA  #$C0   }
 A08B-  39 09 A9   AND  $A909,Y }
 A08E-  F0 02      BEQ  $A092  SYNTAX ERROR IF NOT OPTIONAL
 A090-  10 3F      BPL  $A0D1  OPTIONAL, GO ON
 A092-  4C 00 A0   JMP  $A000  SYNTAX ERROR/OR PASS IT THROUGH
 A095-  A0 3C      LDY  #$3C   60   BLANK BOTH FILENAMES
 A097-  A9 A0      LDA  #$A0   b
 A099-  99 74 AA   STA  $AA74,Y } CLEAR 60 BYTES
 A09C-  88         DEY         }
 A09D-  D0 FA      BNE  $A099  }
 A09F-  60         RTS
 A0A0-  8D 75 AA   STA  $AA75  NO FILENAME PARSED
 A0A3-  A9 0C      LDA  #$0C   } NO POSITIONAL OPERAND?
 A0A5-  39 09 A9   AND  $A909,Y }
 A0A8-  F0 27      BEQ  $A0D1  }
 A0AA-  20 B9 A1   JSR  $A1B9  PARSE NUMERIC
 A0AD-  B0 1F      BCS  $A0CE  SYNTAX ERROR IF NONE
 A0AF-  A8         TAY         } >256? "RANGE ERROR"
 A0B0-  D0 17      BNE  $A0C9  }
 A0B2-  E0 11      CPX  #$11   } >17? "RANGE ERROR"
 A0B4-  B0 13      BCS  $A0C9  }
```

FILENAMES PARSED

POSITIONAL NUMERIC

```
A0B6-  AC 5F AA   LDY  $AA5F   }
A0B9-  A9 08      LDA  #$08    } SLOT #? (PR#, IN#)
A0BB-  39 09 A9   AND  $A909,Y }
A0BE-  F0 06      BEQ  $A0C6     NO
A0C0-  E0 08      CPX  #$08    }
A0C2-  B0 CE      BCS  $A092   } ≥ 8?
A0C4-  90 0B      BCC  $A0D1     < 8
A0C6-  8A         TXA            }
A0C7-  D0 08      BNE  $A0D1     } MAXFILES = Ø? INVALID IF SO
A0C9-  A9 02      LDA  #$02      "RANGE ERROR"
A0CB-  4C D2 A6   JMP  $A6D2
A0CE-  4C C4 A6   JMP  $A6C4     "SYNTAX ERROR"
A0D1-  A9 00      LDA  #$00    }
A0D3-  8D 65 AA   STA  $AA65   }
A0D6-  8D 74 AA   STA  $AA74   } SET DEFAULTS
A0D9-  8D 66 AA   STA  $AA66   } FOR KEYWORD
A0DC-  8D 6C AA   STA  $AA6C   } OPERANDS
A0DF-  8D 6D AA   STA  $AA6D   }
A0E2-  20 DC BF   JSR  $BFDC   SOME ADDITIONAL DEFAULTS
A0E5-  AD 5D AA   LDA  $AA5D   GET LINE INDEX
A0E8-  20 A4 A1   JSR  $A1A4   NEXT NON-BLANK
A0EB-  D0 1F      BNE  $A10C   }
A0ED-  C9 8D      CMP  #$8D    } SKIP EXCESS COMMAS
A0EF-  D0 F7      BNE  $A0E8   }
A0F1-  AE 5F AA   LDX  $AA5F   END OF LINE, GET CMD #
A0F4-  AD 65 AA   LDA  $AA65   WHICH KEYWORDS WERE GIVEN?
A0F7-  1D 0A A9   ORA  $A90A,X   PLUS ALL VALID
A0FA-  5D 0A A9   EOR  $A90A,X } WERE ANY KEYS GIVEN WHICH ARE
A0FD-  D0 93      BNE  $A092   } UNEXPECTED FOR THIS CMD?
A0FF-  AE 63 AA   LDX  $AA63   RESCAN?
A102-  F0 76      BEQ  $A17A   NORMAL COMMAND EXIT IF NOT
A104-  8D 63 AA   STA  $AA63   CLEAR FLAG
A107-  8E 5D AA   STX  $AA5D   SET LINE INDEX
A10A-  D0 DC      BNE  $A0E8   AND GO SCAN
A10C-  A2 0A      LDX  #$0A    1Ø KEYWORDS
A10E-  DD 40 A9   CMP  $A940,X }
A111-  F0 05      BEQ  $A118   } LOOK UP KEYWORD IN TABLE
A113-  CA         DEX          }
A114-  D0 F8      BNE  $A10E   }
A116-  F0 B6      BEQ  $A0CE   NOT IN TABLE - "SYNTAX ERROR"
A118-  BD 4A A9   LDA  $A94A,X GET ITS BIT POSITION
A11B-  30 47      BMI  $A164   NO NUMERIC VALUE (C,I or O)
A11D-  0D 65 AA   ORA  $AA65   } INDICATE THIS OPERAND PRESENT
A120-  8D 65 AA   STA  $AA65   }
A123-  CA         DEX          } KEYWORD INDEX SAVED
A124-  8E 64 AA   STX  $AA64   }
A127-  20 B9 A1   JSR  $A1B9   GET NUMERIC VALUE
A12A-  B0 A2      BCS  $A0CE   "SYNTAX ERROR" IF BAD
A12C-  AD 64 AA   LDA  $AA64   }
A12F-  0A         ASL          } Y = INDEX * 4
A130-  0A         ASL          }
A131-  A8         TAY
A132-  A5 45      LDA  $45     }
A134-  D0 09      BNE  $A13F   }
A136-  A5 44      LDA  $44     }
A138-  D9 55 A9   CMP  $A955,Y }
A13B-  90 8C      BCC  $A0C9   } IS NUMBER WITHIN
A13D-  A5 45      LDA  $45     } ALLOWABLE RANGE
A13F-  D9 58 A9   CMP  $A958,Y } FOR THIS KEYWORD?
A142-  90 0B      BCC  $A14F   }
A144-  D0 83      BNE  $A0C9   }
A146-  A5 44      LDA  $44     }
A148-  D9 57 A9   CMP  $A957,Y }
```

```
A14B-  90 02     BCC  $A14F
A14D-  D0 F5     BNE  $A144
A14F-  AD 63 AA  LDA  $AA63   FIRST SCAN (DON'T CHANGE KEYWORDS)?
A152-  D0 94     BNE  $A0E8   YES
A154-  98        TYA          } KEYWORD INDEX AGAIN
A155-  4A        LSR          }      (*1)
A156-  A8        TAY          }
A157-  A5 45     LDA  $45     }
A159-  99 67 AA  STA  $AA67,Y } SAVE VALUE IN TABLE
A15C-  A5 44     LDA  $44     }
A15E-  99 66 AA  STA  $AA66,Y }
A161-  4C E8 A0  JMP  $A0E8   GET NEXT KEYWORD
A164-  48        PHA
A165-  A9 80     LDA  #$80    }
A167-  0D 65 AA  ORA  $AA65   } C,I or O parsed
A16A-  8D 65 AA  STA  $AA65   }
A16D-  68        PLA
A16E-  29 7F     AND  #$7F    }
A170-  0D 74 AA  ORA  $AA74   } UPDATE MON VALUE   40 - C
A173-  8D 74 AA  STA  $AA74   }                    20 - I
A176-  D0 E9     BNE  $A161   GET NEXT KEYWORD     10 - O
A178-  F0 9C     BEQ  $A116   THIS CAN'T HAPPEN
```

```
A17A-  20 80 A1  JSR  $A180   GO PROCESS COMMAND
A17D-  4C 83 9F  JMP  $9F83   THEN EXIT VIA ECHO
```

DO COMMAND

```
A180-  20 5B A7  JSR  $A75B   RESET STATE
A183-  20 AE A1  JSR  $A1AE   CLEAR FIO PARMLIST
A186-  AD 5F AA  LDA  $AA5F   COMMAND INDEX
A189-  AA        TAX
A18A-  BD 1F 9D  LDA  $9D1F,X } PUT COMMAND HANDLER LOC
A18D-  48        PHA          } ON STACK TO "RETURN" THRU IT
A18E-  BD 1E 9D  LDA  $9D1E,X }
A191-  48        PHA
A192-  60        RTS          GO TO COMMAND HANDLER
```

GET NEXT CHAR ON LINE

```
A193-  AE 5D AA  LDX  $AA5D   GET LINE INDEX
A196-  BD 00 02  LDA  $0200,X GET NEXT CHARACTER
A199-  C9 8D     CMP  #$8D    END OF LINE?
A19B-  F0 06     BEQ  $A1A3   YES
A19D-  E8        INX          } UPDATE LINE INDEX
A19E-  8E 5D AA  STX  $AA5D   }
A1A1-  C9 AC     CMP  #$AC    IS IT A COMMA?
A1A3-  60        RTS          OR CR?
```

FLUSH TO NEXT NON-BLANK

```
A1A4-  20 93 A1  JSR  $A193   GET NEXT CHARACTER
A1A7-  F0 FA     BEQ  $A1A3   COMMA OR CR?
A1A9-  C9 A0     CMP  #$A0    BLANK?
A1AB-  F0 F7     BEQ  $A1A4   YES, SKIP IT
A1AD-  60        RTS          NO, NON BLANK
```

CLEAR FIO PARMLIST

```
A1AE-  A9 00     LDA  #$00
A1B0-  A0 16     LDY  #$16
A1B2-  99 BA B5  STA  $B5BA,Y ZERO 22 BYTES
A1B5-  88        DEY          OF FIO PARMS
A1B6-  D0 FA     BNE  $A1B2
A1B8-  60        RTS
```

PARSE NUMERIC OPERAND

```
A1B9-  A9 00     LDA  #$00    }
A1BB-  85 44     STA  $44     } NUM=0
A1BD-  85 45     STA  $45     }
A1BF-  20 A4 A1  JSR  $A1A4   GET FIRST NON-B
A1C2-  08        PHP          REMEMBER STATUS
A1C3-  C9 A4     CMP  #$A4    } "$" ?
A1C5-  F0 3C     BEQ  $A203   }
A1C7-  28        PLP
A1C8-  4C CE A1  JMP  $A1CE
A1CB-  20 A4 A1  JSR  $A1A4   NEXT CHAR
A1CE-  D0 06     BNE  $A1D6   END?
```

OUTPUT:
X, A = VALUE

```
A1D0-  A6 44     LDX  $44        GET NUM
A1D2-  A5 45     LDA  $45
A1D4-  18        CLC
A1D5-  60        RTS             EXIT
```

DECIMAL CONVERT

```
A1D6-  38        SEC             } CONVERT TO BINARY
A1D7-  E9 B0     SBC  #$B0       }
A1D9-  30 21     BMI  $A1FC      BAD!
A1DB-  C9 0A     CMP  #$0A       } TOO HIGH?
A1DD-  B0 1D     BCS  $A1FC      }
A1DF-  20 FE A1  JSR  $A1FE      NUM=NUM*2
A1E2-  65 44     ADC  $44        }
A1E4-  AA        TAX             }
A1E5-  A9 00     LDA  #$00       } X,Y = NUM+DIGIT
A1E7-  65 45     ADC  $45        }
A1E9-  A8        TAY             }
A1EA-  20 FE A1  JSR  $A1FE      } NUM=NUM*4
A1ED-  20 FE A1  JSR  $A1FE      }
A1F0-  8A        TXA             }
A1F1-  65 44     ADC  $44        } NUM=NUM+X,Y
A1F3-  85 44     STA  $44        }
A1F5-  98        TYA             }
A1F6-  65 45     ADC  $45        }
A1F8-  85 45     STA  $45        }
A1FA-  90 CF     BCC  $A1CB      CONTINUE
A1FC-  38        SEC             INVALID NUMERIC EXIT
A1FD-  60        RTS
```

NUM= NUM*10 +DIGIT

```
A1FE-  06 44     ASL  $44
A200-  26 45     ROL  $45        ROTATE NUM
A202-  60        RTS
```

PARSE HEX NUMBER

```
A203-  28        PLP
A204-  20 A4 A1  JSR  $A1A4      GET NEXT CHARACTER
A207-  F0 C5     BEQ  $A1CE      END?
A209-  38        SEC
A20A-  E9 B0     SBC  #$B0       CONVERT DIGIT TO BINARY
A20C-  30 EE     BMI  $A1FC      }
A20E-  C9 0A     CMP  #$0A       } VALIDITY CHECK NUMERICS
A210-  90 08     BCC  $A21A      }
A212-  E9 07     SBC  #$07       }
A214-  30 E6     BMI  $A1FC      } CONVERT & CHECK A-F
A216-  C9 10     CMP  #$10       }
A218-  B0 E2     BCS  $A1FC      }
A21A-  A2 04     LDX  #$04       }
A21C-  20 FE A1  JSR  $A1FE      } SHIFT NUM UP 1 NIBBLE
A21F-  CA        DEX             }
A220-  D0 FA     BNE  $A21C      }
A222-  05 44     ORA  $44        } ADD IN THIS DIGIT
A224-  85 44     STA  $44        }
A226-  4C 04 A2  JMP  $A204      Go GET NEXT
```

PR#

```
A229-  A5 44     LDA  $44        GET NUMERIC VALUE
A22B-  4C 95 FE  JMP  $FE95      EXIT THRU "OUTPORT" IN ROM
```

IN#

```
A22E-  A5 44     LDA  $44        GET NUMERIC VALUE
A230-  4C 8B FE  JMP  $FE8B      EXIT THRU "INPORT" IN ROM
```

MON

```
A233-  AD 5E AA  LDA  $AA5E      }
A236-  0D 74 AA  ORA  $AA74      } ADD NEW MON FLAGS TO OLD
A239-  8D 5E AA  STA  $AA5E      }
A23C-  60        RTS
```

NOMON

```
A23D-  2C 74 AA  BIT  $AA74      } 40 SET?
A240-  50 03     BVC  $A245      }
A242-  20 C8 9F  JSR  $9FC8      YES, WILL ECHO THIS SO GO TO A NEW LINE
A245-  A9 70     LDA  #$70       ] MAKE MASK
A247-  4D 74 AA  EOR  $AA74      ]
A24A-  2D 5E AA  AND  $AA5E      } TURN OFF DESIRED BITS
A24D-  8D 5E AA  STA  $AA5E      }
```

```
A250-  60          RTS
A251-  A9 00       LDA  #$00      } NO EXEC FILE NOW          MAXFILES
A253-  8D B3 AA    STA  $AAB3     }
A256-  A5 44       LDA  $44       GET NUMERIC VALUE
A258-  48          PHA
A259-  20 16 A3    JSR  $A316     CLOSE ALL OPEN FILES
A25C-  68          PLA
A25D-  8D 57 AA    STA  $AA57     SET NEW MAXFILES #
A260-  4C D4 A7    JMP  $A7D4     REINITIALIZE FILE BUFFERS/THEN EXIT
A263-  A9 05       LDA  #$05      DELETE OPCODE              DELETE
A265-  20 AA A2    JSR  $A2AA     GO DO IT
A268-  20 64 A7    JSR  $A764     LOCATE BUFFER USED
A26B-  A0 00       LDY  #$00      }
A26D-  98          TYA            } AND FREE IT
A26E-  91 40       STA  ($40),Y   }
A270-  60          RTS
A271-  A9 07       LDA  #$07      LOCK OPCODE                LOCK
A273-  D0 02       BNE  $A277
A275-  A9 08       LDA  #$08      UNLOCK                     UNLOCK
A277-  20 AA A2    JSR  $A2AA     CALL FIO TO DO IT
A27A-  4C EA A2    JMP  $A2EA     NOW CLOSE
A27D-  A9 0C       LDA  #$0C      VERIFY OPCODE              VERIFY
A27F-  D0 F6       BNE  $A277
A281-  AD 08 9D    LDA  $9D08     }                          RENAME
A284-  8D BD B5    STA  $B5BD     } PARM1 = ↑ FILENAME #2
A287-  AD 09 9D    LDA  $9D09     }
A28A-  8D BE B5    STA  $B5BE     }
A28D-  A9 09       LDA  #$09      } RENAME OPCODE
A28F-  8D 63 AA    STA  $AA63     }
A292-  20 C8 A2    JSR  $A2C8     CALL FIO
A295-  4C EA A2    JMP  $A2EA     AND CLOSE
A298-  20 A3 A2    JSR  $A2A3     OPEN FILE                  APPEND
A29B-  20 8C A6    JSR  $A68C     } READ FILE TO FIRST ØØ
A29E-  D0 FB       BNE  $A29B     }
A2A0-  4C 46 A5    JMP  $A546     (DOS 3.3 PATCH)
*A2A3- A9 00       LDA  #$00      OPEN A TEXT FILE ONLY      OPEN
*A2A5- 4C D5 A3    JMP  $A3D5
A2A8-  A9 01       LDA  #$01      } OPCODE = OPEN
→A2AA- 8D 63 AA    STA  $AA63     }
A2AD-  AD 6C AA    LDA  $AA6C     }
A2B0-  D0 0A       BNE  $A2BC     }
A2B2-  AD 6D AA    LDA  $AA6D     } IF NO L GIVEN,
A2B5-  D0 05       ←BNE $A2BC     } USE ØØØ1
A2B7-  A9 01       LDA  #$01      }
A2B9-  8D 6C AA    STA  $AA6C     }
A2BC-  AD 6C AA    →LDA $AA6C     }
A2BF-  8D BD B5    STA  $B5BD     } PARM1 = L VALUE
A2C2-  AD 6D AA    LDA  $AA6D     }
A2C5-  8D BE B5    STA  $B5BE     }
-A2C8- 20 EA A2    JSR  $A2EA     CLOSE IT IF OPEN ALREADY
A2CB-  A5 45       LDA  $45       } FOUND A BUFFER?
A2CD-  D0 03       BNE  $A2D2     }
A2CF-  4C C8 A6    JMP  $A6C8     "NO FILE BUFS AVAILABLE"
A2D2-  85 41       →STA $41       }
A2D4-  A5 44       LDA  $44       } [$40] → BUFFER
A2D6-  85 40       STA  $40       }
A2D8-  20 43 A7    JSR  $A743     COPY FILENAME TO BUFFER (ALLOCATES IT)
A2DB-  20 4E A7    JSR  $A74E     COPY BUFFER PTRS TO FIO PARM LIST
A2DE-  20 1A A7    JSR  $A71A     FINISH FIO PARMLIST (V,D,S, FILENAME↑)
A2E1-  AD 63 AA    LDA  $AA63     } SET OPERATION CODE
A2E4-  8D BB B5    STA  $B5BB     }
A2E7-  4C A8 A6    JMP  $A6A8     EXIT THROUGH FIO DRIVER
A2EA-  AD 75 AA    LDA  $AA75     FIRST CHAR OF FILE         CLOSE
```

```
A2ED-  C9 A0      CMP  #$A0     NO FILENAME?
A2EF-  F0 25      BEQ  $A316    THEN CLOSE ALL FILES
A2F1-  20 64 A7   JSR  $A764    OTHERWISE, FIND OPEN FILE BUFFER
A2F4-  B0 3A      BCS  $A330    NO SUCH FILE OPEN? IGNORE IT.
A2F6-  20 FC A2   JSR  $A2FC    CLOSE FILE /FREE BUFFER
A2F9-  4C EA A2   JMP  $A2EA    NOW MAKE SURE THERE AREN'T TWO
```

CLOSE A FILE

```
A2FC-  20 AF A7   JSR  $A7AF    IS THIS BUFFER EXEC?
A2FF-  D0 05      BNE  $A306    NO
A301-  A9 00      LDA  #$00     } YES, TURN EXEC OFF FIRST
A303-  8D B3 AA   STA  $AAB3    }
A306-  A0 00      LDY  #$00     }
A308-  98         TYA           } RELEASE BUFFER
A309-  91 40      STA  ($40),Y  }
A30B-  20 4E A7   JSR  $A74E    FILE PTRS TO FIO PARMAREA
A30E-  A9 02      LDA  #$02     } CLOSE/FIO OPCODE
A310-  8D BB B5   STA  $B5BB    }
A313-  4C A8 A6   JMP  $A6A8    EXIT THRU FIO
```

CLOSE ALL FILES

```
A316-  20 92 A7   JSR  $A792    GET FIRST FILE BUFFER
A319-  D0 05      BNE  $A320    ALWAYS THERE
A31B-  20 9A A7   JSR  $A79A    YES, GET NEXT
A31E-  F0 10      BEQ  $A330    END OF CHAIN?
A320-  20 AF A7   JSR  $A7AF    IS IT EXEC?
A323-  F0 F6      BEQ  $A31B    YES, SKIP IT
A325-  20 AA A7   JSR  $A7AA    GET FIRST FILENAME CHAR
A328-  F0 F1      BEQ  $A31B    CLOSED, SKIP IT
A32A-  20 FC A2   JSR  $A2FC    OPEN, SO CLOSE IT
A32D-  4C 16 A3   JMP  $A316    START ALL OVER
A330-  60         RTS
```

BSAVE

```
A331-  A9 09      LDA  #$09     }
A333-  2D 65 AA   AND  $AA65    } "A" and "L" operands given?
A336-  C9 09      CMP  #$09     }
A338-  F0 03      BEQ  $A33D    }
A33A-  4C 00 A0   JMP  $A000    NO, SYNTAX ERROR
A33D-  A9 04      LDA  #$04     } OPEN & CHECK B TYPE FILE
A33F-  20 D5 A3   JSR  $A3D5    }
A342-  AD 73 AA   LDA  $AA73    } GET "A" VALUE
A345-  AC 72 AA   LDY  $AA72    }
A348-  20 E0 A3   JSR  $A3E0    WRITE IT
A34B-  AD 6D AA   LDA  $AA6D    } GET "L" VALUE
A34E-  AC 6C AA   LDY  $AA6C    }
A351-  20 E0 A3   JSR  $A3E0    WRITE IT
A354-  AD 73 AA   LDA  $AA73    } GET "A" AGAIN
A357-  AC 72 AA   LDY  $AA72    }
A35A-  4C FF A3   JMP  $A3FF    GO WRITE A RANGE
```

BLOAD

```
A35D-  20 A8 A2   JSR  $A2A8    OPEN FILE
A360-  A9 7F      LDA  #$7F     } GET FILE TYPE
A362-  2D C2 B5   AND  $B5C2    }
A365-  C9 04      CMP  #$04     } B TYPE FILE?
A367-  F0 03      BEQ  $A36C    }
A369-  4C D0 A6   JMP  $A6D0    NO, "FILE TYPE MISMATCH"
A36C-  A9 04      LDA  #$04     } OPEN & TEST FILE TYPE
A36E-  20 D5 A3   JSR  $A3D5    }
A371-  20 7A A4   JSR  $A47A    READ ADDRESS
A374-  AA         TAX           SAVE A HIGH
A375-  AD 65 AA   LDA  $AA65    }
A378-  29 01      AND  #$01     } "A" KEYWORD GIVEN?
A37A-  D0 06      BNE  $A382    }
A37C-  8E 72 AA   STX  $AA72    } NO, USE VALUE JUST READ
A37F-  8C 73 AA   STY  $AA73    }
A382-  20 7A A4   JSR  $A47A    READ LENGTH
A385-  AE 72 AA   LDX  $AA72    } GET ADDRESS
A388-  AC 73 AA   LDY  $AA73    }
A38B-  4C 71 A4   JMP  $A471    GO READ RANGE OF DATA
```

```
A38E-  20 5D A3   JSR  $A35D   BLOAD FILE                          BRUN
A391-  20 51 A8   JSR  $A851   SET DOS INTERCEPTS
A394-  6C 72 AA   JMP  ($AA72) THEN JUMP TO [A]
-------------------------------------------------------------------------
A397-  AD B6 AA   LDA  $AAB6   GET BASIC TYPE                       SAVE
A39A-  F0 20      BEQ  $A3BC   INT?
A39C-  A5 D6      LDA  $D6     FP, TOO BIG?
A39E-  10 03      BPL  $A3A3
A3A0-  4C CC A6   JMP  $A6CC   "PROGRAM TOO LARGE"
A3A3-  A9 02      LDA  #$02    } OPEN AND TEST FOR "A" TYPE FILE
A3A5-  20 D5 A3   JSR  $A3D5
A3A8-  38         SEC
A3A9-  A5 AF      LDA  $AF     } COMPUTE PROGRAM LENGTH
A3AB-  E5 67      SBC  $67       (PGMEND - LOMEM)
A3AD-  A8         TAY
A3AE-  A5 B0      LDA  $B0
A3B0-  E5 68      SBC  $68
A3B2-  20 E0 A3   JSR  $A3E0   WRITE LENGTH
A3B5-  A5 68      LDA  $68     } WRITE A RANGE FROM LOMEM/EXIT
A3B7-  A4 67      LDY  $67
A3B9-  4C FF A3   JMP  $A3FF
A3BC-  A9 01      LDA  #$01    } OPEN AND TEST FOR "I" TYPE FILE
A3BE-  20 D5 A3   JSR  $A3D5
A3C1-  38         SEC
A3C2-  A5 4C      LDA  $4C     } COMPUTE PROGRAM LENGTH
A3C4-  E5 CA      SBC  $CA       (HIMEM - PP)
A3C6-  A8         TAY
A3C7-  A5 4D      LDA  $4D
A3C9-  E5 CB      SBC  $CB
A3CB-  20 E0 A3   JSR  $A3E0   WRITE LENGTH
A3CE-  A5 CB      LDA  $CB     } WRITE RANGE FROM PP/EXIT
A3D0-  A4 CA      LDY  $CA
A3D2-  4C FF A3   JMP  $A3FF
-------------------------------------------------------------------------
A3D5-  8D C2 B5   STA  $B5C2   SET FILE TYPE WANTED                 OPEN & TEST
A3D8-  48         PHA                                               FILE TYPE
A3D9-  20 A8 A2   JSR  $A2A8   OPEN FILE
A3DC-  68         PLA
A3DD-  4C C4 A7   JMP  $A7C4   GO CHECK IT
-------------------------------------------------------------------------
A3E0-  8C C1 B5   STY  $B5C1   SAVE VALUE IN LENGTH PARM            WRITE A
A3E3-  8C C3 B5   STY  $B5C3   WRITE LOW BYTE FIRST                 2 BYTE VALUE
A3E6-  8D C2 B5   STA  $B5C2
A3E9-  A9 04      LDA  #$04    } WRITE OPCODE
A3EB-  8D BB B5   STA  $B5BB
A3EE-  A9 01      LDA  #$01    } DO ONE BYTE
A3F0-  8D BC B5   STA  $B5BC
A3F3-  20 A8 A6   JSR  $A6A8   CALL FIO
A3F6-  AD C2 B5   LDA  $B5C2   } NOW DO HIGH BYTE
A3F9-  8D C3 B5   STA  $B5C3
A3FC-  4C A8 A6   JMP  $A6A8   WRITE IT AND EXIT
-------------------------------------------------------------------------
A3FF-  8C C3 B5   STY  $B5C3   } SET ADDRESS                        I/O A RANGE
A402-  8D C4 B5   STA  $B5C4
A405-  A9 02      LDA  #$02    } SET SUBCODE TO I/O A RANGE OF BYTES
A407-  8D BC B5   STA  $B5BC
A40A-  20 A8 A6   JSR  $A6A8   CALL FIO
A40D-  4C EA A2   JMP  $A2EA   THEN CLOSE
-------------------------------------------------------------------------
A410-  4C D0 A6   JMP  $A6D0   "FILE TYPE MISMATCH"
-------------------------------------------------------------------------
A413-  20 16 A3   JSR  $A316   CLOSE ALL FILES                      LOAD
A416-  20 A8 A2   JSR  $A2A8   OPEN THE FILE
A419-  A9 23      LDA  #$23    } VALID FILE TYPE?
A41B-  2D C2 B5   AND  $B5C2
A41E-  F0 F0      BEQ  $A410   NO, "FILE TYPE MISMATCH"
A420-  8D C2 B5   STA  $B5C2
A423-  AD B6 AA   LDA  $AAB6   WHICH BASIC IS ACTIVE
A426-  F0 28      BEQ  $A450   INT
```

```
A428-  A9 02     LDA  #$02   WE WANT FP BASIC
A42A-  20 B1 A4  JSR  $A4B1  GO SET IT UP
A42D-  20 7A A4  JSR  $A47A  READ LENGTH OF PGM
A430-  18        CLC
A431-  65 67     ADC  $67    } ADD LENGTH TO LOMEM/PGM START
A433-  AA        TAX
A434-  98        TYA
A435-  65 68     ADC  $68
A437-  C5 74     CMP  $74    } BEYOND HIMEM?
A439-  B0 70     BCS  $A4AB  }
A43B-  85 B0     STA  $B0    ← SET PGM HIGH
A43D-  85 6A     STA  $6A    ←
A43F-  86 AF     STX  $AF    ← AND BEGINNING OF VARIABLES
A441-  86 69     STX  $69    ←
A443-  A6 67     LDX  $67    } SET STARTING ADDRESS
A445-  A4 68     LDY  $68    }
A447-  20 71 A4  JSR  $A471  READ RANGE INTO MEMORY
A44A-  20 51 A8  JSR  $A851  SET DOS INTERCEPTS
*A44D- 6C 60 9D  JMP  ($9D60) RELOCATE PROGRAM TO THIS BASIC

A450-  A9 01     LDA  #$01   } SET INT BASIC
A452-  20 B1 A4  JSR  $A4B1  }
A455-  20 7A A4  JSR  $A47A  READ LENGTH
A458-  38        SEC
A459-  A5 4C     LDA  $4C    }
A45B-  ED 60 AA  SBC  $AA60  } HIMEM - LENGTH
A45E-  AA        TAX         } GIVES PGM START
A45F-  A5 4D     LDA  $4D    }
A461-  ED 61 AA  SBC  $AA61  }
A464-  90 45     BCC  $A4AB  TOO LARGE
A466-  A8        TAY
A467-  C4 4B     CPY  $4B    } PAST LOMEM?
A469-  90 40     BCC  $A4AB  }
A46B-  F0 3E     BEQ  $A4AB
A46D-  84 CB     STY  $CB    } SET PGM START
A46F-  86 CA     STX  $CA    }
A471-  8E C3 B5  STX  $B5C3  } SET STARTING ADDRESS
A474-  8C C4 B5  STY  $B5C4  }
A477-  4C 0A A4  JMP  $A40A  GO READ PGM INTO MEMORY

A47A-  AD 0A 9D  LDA  $9D0A  }
A47D-  8D C3 B5  STA  $B5C3  } READ INTO $AA60
A480-  AD 0B 9D  LDA  $9D0B  } (RANGE LENGTH)
A483-  8D C4 B5  STA  $B5C4  }
A486-  A9 00     LDA  #$00   }
A488-  8D C2 B5  STA  $B5C2  } READ 2 BYTES
A48B-  A9 02     LDA  #$02   }
A48D-  8D C1 B5  STA  $B5C1  }
A490-  A9 03     LDA  #$03   }
A492-  8D BB B5  STA  $B5BB  } READ A RANGE OF
A495-  A9 02     LDA  #$02   } BYTES
A497-  8D BC B5  STA  $B5BC  }
A49A-  20 A8 A6  JSR  $A6A8  CALL FIO
A49D-  AD 61 AA  LDA  $AA61  }
A4A0-  8D C2 B5  STA  $B5C2  } SET RANGE LENGTH
A4A3-  A8        TAY         } IN FIO PARM LIST
A4A4-  AD 60 AA  LDA  $AA60  }
A4A7-  8D C1 B5  STA  $B5C1  }
A4AA-  60        RTS

A4AB-  20 EA A2  JSR  $A2EA  CLOSE FILE
A4AE-  4C CC A6  JMP  $A6CC  "PROGRAM TO LARGE"

A4B1-  CD C2 B5  CMP  $B5C2  } ALREADY IN PROPER BASIC?
A4B4-  F0 1A     BEQ  $A4D0  }
A4B6-  AE 5F AA  LDX  $AA5F  } REMEMBER CURRENT COMMAND
A4B9-  8E 62 AA  STX  $AA62  }
```

FP LOAD

INT LOAD

READ LENGTH VALUE FROM FILE

SET PROPER BASIC

```
A4BC-  4A        LSR          } INT?
A4BD-  F0 03     BEQ  $A4C2   }
A4BF-  4C 9E A5  JMP  $A59E   NO, GO SET IT
A4C2-  A2 1D     LDX  #$1D
A4C4-  BD 75 AA  LDA  $AA75,X }
A4C7-  9D 93 AA  STA  $AA93,X } COPY PRIMARY FILENAME
A4CA-  CA        DEX          } TO SECONDARY
A4CB-  10 F7     BPL  $A4C4   }
A4CD-  4C 7A A5  JMP  $A57A   GO SET FP
A4D0-  60        RTS
```

RUN

```
*A4D1-  AD B6 AA  LDA  $AAB6   } FP?
*A4D4-  F0 03     BEQ  $A4D9   }
*A4D6-  8D B7 AA  STA  $AAB7   IF SO SIGNAL SPECIAL EXIT FROM STATE=0
 A4D9-  20 13 A4  JSR  $A413   LOAD PROGRAM
 A4DC-  20 C8 9F  JSR  $9FC8   SKIP A LINE
 A4DF-  20 51 A8  JSR  $A851   DOS INTERCEPTS BACK
 A4E2-  6C 58 9D  JMP  ($9D58) RUN BASIC P6M
```

INT BASIC RUN EPA

```
A4E5-  A5 4A     LDA  $4A     }
A4E7-  85 CC     STA  $CC     } DELETE ALL
A4E9-  A5 4B     LDA  $4B     }   VARIABLES
A4EB-  85 CD     STA  $CD     }
A4ED-  6C 56 9D  JMP  ($9D56) INT BASIC "CHAIN" EPA
```

CHAIN

```
A4F0-  20 16 A4  JSR  $A416   LOAD IT
A4F3-  20 C8 9F  JSR  $9FC8   NEW LINE
A4F6-  20 51 A8  JSR  $A851   SET DOS INTERCEPTS
A4F9-  6C 56 9D  JMP  ($9D56) GO TO BASIC CHAIN EPA
```

FP ROM RUN

```
A4FC-  20 65 D6  JSR  $D665   CLEAR VARIABLES
A4FF-  85 33     STA  $33     } SET PROMPT
A501-  85 D8     STA  $D8     } AND ONERR
A503-  4C D2 D7  JMP  $D7D2   GO RUN
```

FP RAM RUN

```
A506-  20 65 0E  JSR  $0E65   }
A509-  85 33     STA  $33     } SAME AS ABOVE
A50B-  85 D8     STA  $D8     }
A50D-  4C D4 0F  JMP  $0FD4   }
```

WRITE

```
A510-  20 26 A5  JSR  $A526
A513-  A9 05     LDA  #$05    } SET CSWL WRITE STATE
A515-  8D 52 AA  STA  $AA52   }
A518-  4C 83 9F  JMP  $9F83   EXIT DOS
```

READ

```
A51B-  20 26 A5  JSR  $A526
A51E-  A9 01     LDA  #$01    } SET READ MODE
A520-  8D 51 AA  STA  $AA51   }
A523-  4C 83 9F  JMP  $9F83   EXIT DOS
```

```
A526-  20 64 A7  JSR  $A764   FIND FILE BUFFER
A529-  90 06     BCC  $A531   OK
A52B-  20 A3 A2  JSR  $A2A3   OPEN IT IF NOT ALREADY
A52E-  4C 34 A5  JMP  $A534
A531-  20 4E A7  JSR  $A74E   SET FIO BUFF PTRS
A534-  AD 65 AA  LDA  $AA65
A537-  29 06     AND  #$06    } R or B GIVEN?
A539-  F0 13     BEQ  $A54E   }
A53B-  A2 03     LDX  #$03    }
A53D-  BD 6E AA  LDA  $AA6E,X } YES, COPY TO FIO PARMLIST
A540-  9D BD B5  STA  $B5BD,X }
A543-  CA        DEX          }
A544-  10 F7     BPL  $A53D   }
A546-  A9 0A     LDA  #$0A    } POSITION CALL
A548-  8D BB B5  STA  $B5BB   }
A54B-  20 A8 A6  JSR  $A6A8   TO FIO
A54E-  60        RTS
```

INIT

```
A54F-  A9 40     LDA  #$40    }
A551-  2D 65 AA  AND  $AA65   } V GIVEN?
A554-  F0 05     BEQ  $A55B   }
A556-  AD 66 AA  LDA  $AA66   YES, GET IT
```

```
A559-   D0 05       BNE   $A560   VALID?
A55B-   A9 FE       LDA   #$FE    IF NOT, USE 254
A55D-   8D 66 AA    STA   $AA66   REPLACE V VALUE
A560-   AD 0D 9D    LDA   $9D0D   } SUBCODE = FIRST PAGE OF DOS IMAGE
A563-   8D BC B5    STA   $B5BC   }
A566-   A9 0B       LDA   #$0B    } INIT CALL TO FIO
A568-   20 AA A2    JSR   $A2AA   }
A56B-   4C 97 A3    JMP   $A397   EXIT BY SAVING GREETING PROG
A56E-   A9 06       LDA   #$06    } CATALOG CALL TO FIO   CATALOG
A570-   20 AA A2    JSR   $A2AA   }
A573-   AD BF B5    LDA   $B5BF   } SET NEW V VALUE
A576-   8D 66 AA    STA   $AA66   }
A579-   60          RTS
A57A-   A9 4C       LDA   #$4C    } SET ROM CARD FOR FP   FP
A57C-   20 B2 A5    JSR   $A5B2   }
A57F-   F0 2E       BEQ   $A5AF   GOT IT, DONE, COLDSTART DOS
A581-   A9 00       LDA   #$00    } WE ARE IN INT
A583-   8D B6 AA    STA   $AAB6   }
A586-   A0 1E       LDY   #$1E    } BLANK PRIMARY FILENAME
A588-   20 97 A0    JSR   $A097   }
A58B-   A2 09       LDX   #$09
A58D-   BD B7 AA    LDA   $AAB7,X } COPY "APPLESOFT" TO
A590-   9D 74 AA    STA   $AA74,X } PRIMARY FILENAME
A593-   CA          DEX
A594-   D0 F7       BNE   $A58D
A596-   A9 C0       LDA   #$C0    } COLDSTART WITH RAM FP
A598-   8D 51 AA    STA   $AA51   }
A59B-   4C D1 A4    JMP   $A4D1   RUN APPLESOFT
A59E-   A9 20       LDA   #$20    } SET ROM FOR INT   INT
A5A0-   20 B2 A5    JSR   $A5B2   }
A5A3-   F0 05       BEQ   $A5AA   GOT IT
*A5A5-  A9 01       LDA   #$01    } "LANGUAGE NOT AVAILABLE"
*A5A7-  4C D2 A6    JMP   $A6D2   }
*A5AA-  A9 00       LDA   #$00    } RUN NOT INTERCEPTED
*A5AC-  8D B7 AA    STA   $AAB7   }
A5AF-   4C 84 9D    JMP   $9D84   COLDSTART DOS
A5B2-   CD 00 E0    CMP   $E000   ALREADY SET?   SET ROM TO DESIRED BASIC
A5B5-   F0 0E       BEQ   $A5C5   YES
A5B7-   8D 80 C0    STA   $C080   NO, TRY ROM CARD IN
A5BA-   CD 00 E0    CMP   $E000   GOT IT?
A5BD-   F0 06       BEQ   $A5C5   YES
A5BF-   8D 81 C0    STA   $C081   NO, TRY ROM CARD OUT
A5C2-   CD 00 E0    CMP   $E000   LAST CHANCE
A5C5-   60          RTS
A5C6-   20 A3 A2    JSR   $A2A3   OPEN THE FILE   EXEC
A5C9-   AD 4F AA    LDA   $AA4F
A5CC-   8D B4 AA    STA   $AAB4   } COPY BUFFER ADDRESS
A5CF-   AD 50 AA    LDA   $AA50   } TO EXEC BUFF PTR
A5D2-   8D B5 AA    STA   $AAB5
A5D5-   AD 75 AA    LDA   $AA75   } EXEC FILE ACTIVE
A5D8-   8D B3 AA    STA   $AAB3   }
A5DB-   D0 0E       BNE   $A5EB   GO SKIP "R" LINES
A5DD-   20 64 A7    JSR   $A764   LOCATE OPEN FILE   POSITION
A5E0-   90 06       BCC   $A5E8   OK?
A5E2-   20 A3 A2    JSR   $A2A3   OPEN AS A TEXT FILE
A5E5-   4C EB A5    JMP   $A5EB
A5E8-   20 4E A7    JSR   $A74E   COPY BUFF PTRS TO FIO PARMLIST
A5EB-   AD 65 AA    LDA   $AA65   } R GIVEN AS KEYWORD?
A5EE-   29 04       AND   #$04    }
A5F0-   F0 1B       BEQ   $A60D   NO, DONE
A5F2-   AD 6E AA    LDA   $AA6E
A5F5-   D0 08       BNE   $A5FF
A5F7-   AE 6F AA    LDX   $AA6F
```

NOTE: THIS ROUTINE WORKS REGARDLESS OF WHICH BASIC IS ON BOARD.

```
A5FA-  F0 11       BEQ  $A60D   } DECREMENT R VALUE AND
A5FC-  CE 6F AA    DEC  $AA6F   } COMPARE
A5FF-  CE 6E AA    DEC  $AA6E   }
A602-  20 8C A6  ↱ JSR  $A68C   READ NEXT BYTE
A605-  F0 38     | BEQ  $A63F   END OF FILE? SAY SO
A607-  C9 8D     | CMP  #$8D    END OF LINE?
A609-  D0 F7     ↳ BNE  $A602
A60B-  F0 E5       BEQ  $A5F2   YES
A60D-  60          RTS
```

WRITE A BYTE TO FILE

```
A60E-  20 5E A6    JSR  $A65E   } BASIC EXECUTING? MUST BE
A611-  B0 66       BCS  $A679   }
A613-  AD 5C AA    LDA  $AA5C   GET BYTE
A616-  8D C3 B5    STA  $B5C3   PASS TO FIO
A619-  A9 04       LDA  #$04    }
A61B-  8D BB B5    STA  $B5BB   } WRITE ONE BYTE
A61E-  A9 01       LDA  #$01    }
A620-  8D BC B5    STA  $B5BC   }
A623-  4C A8 A6    JMP  $A6A8   CALL FIO AND EXIT
```

GET DISK INPUT BYTE

```
A626-  20 5E A6    JSR  $A65E   IS A BASIC PROGRAM RUNNING?
A629-  B0 4E       BCS  $A679   NO, CLOSE THIS FILE/RESET
A62B-  A9 06       LDA  #$06    } STATE = 6
A62D-  8D 52 AA    STA  $AA52   }
A630-  20 8C A6    JSR  $A68C   READ NEXT DISK BYTE
A633-  D0 0F       BNE  $A644   NOT END OF FILE...
A635-  20 FC A2    JSR  $A2FC   CLOSE FILE
A638-  A9 03       LDA  #$03    } STATE 3 (EXEC, not READ)?
A63A-  CD 52 AA    CMP  $AA52   }
A63D-  F0 CE       BEQ  $A60D   YES, NO MSG
A63F-  A9 05       LDA  #$05    } ELSE SAY "END OF DATA"
A641-  4C D2 A6    JMP  $A6D2   }
```

EXEC ENTRY

```
*A644-  C9 E0      CMP  #$E0    LOWER CASE?
*A646-  90 02      BCC  $A64A
*A648-  29 7F      AND  #$7F    IF SO, HIGH BIT OFF TO FOOL GETIN
 A64A-  8D 5C AA   STA  $AA5C   SET HIS ACC VALUE
*A64D-  AE 5A AA   LDX  $AA5A   GET INPUT INDEX
*A650-  F0 09      BEQ  $A65B   START OF LINE
*A652-  CA         DEX
*A653-  BD 00 02   LDA  $0200,X } FORCE HIGH BIT ON IN PREVIOUS
*A656-  09 80      ORA  #$80    } IN CASE IT WAS LOWER CASE
*A658-  9D 00 02   STA  $0200,X }
 A65B-  4C B3 9F   JMP  $9FB3   DOS EXIT
```

BASIC IN IMM. OR EXECUTION:

```
A65E-  48          PHA
A65F-  AD B6 AA    LDA  $AAB6
A662-  F0 0E     | BEQ  $A672   INT BASIC?
A664-  A6 76     | LDX  $76     NO, FP
*A666-  E8       | INX          LINE NO. > 65280?
A667-  F0 0D     | BEQ  $A676   YES, NOT RUNNING
A669-  A6 33     | LDX  $33     PROMPT IS "J"?
A66B-  E0 DD     | CPX  #$DD
A66D-  F0 07     | BEQ  $A676   YES
A66F-  68        | PLA          BASIC IS "RUNNING"  (CLC)
A670-  18        | CLC
A671-  60        | RTS
A672-  A5 D9     ↳ LDA  $D9     INTEGER BASIC
A674-  30 F9       BMI  $A66F   RUNNING?
A676-  68          PLA
A677-  38          SEC          BASIC IS IN IMMEDIATE MODE  (SEC)
A678-  60          RTS
```

```
A679-  20 FC A2    JSR  $A2FC   CLOSE CURRENT FILE
A67C-  20 5B A7    JSR  $A75B   WARMSTART / STATE = 0
A67F-  4C B3 9F    JMP  $9FB3   EXIT DOS
```

EXEC READ

```
A682-  20 9D A6    JSR  $A69D   SELECT EXEC FILE
A685-  20 4E A7    JSR  $A74E   COPY FILE BUFF PTRS
```

```
A688-  A9 03     LDA  #$03   } SET STATE = 3 AND GO READ TEXT BYTE
A68A-  D0 A1     BNE  $A62D  }
-------------------------------------------------- READ NEXT TEXT BYTE
A68C-  A9 03     LDA  #$03   }
A68E-  8D BB B5  STA  $B5BB  } READ 1 BYTE
A691-  A9 01     LDA  #$01   }
A693-  8D BC B5  STA  $B5BC  }
A696-  20 A8 A6  JSR  $A6A8  CALL FILE I/O
A699-  AD C3 B5  LDA  $B5C3  GET BYTE READ
A69C-  60        RTS
-------------------------------------------------- POINT TO EXEC BUFF
A69D-  AD B5 AA  LDA  $AAB5
A6A0-  85 41     STA  $41    [$40] → EXEC FILE
A6A2-  AD B4 AA  LDA  $AAB4
A6A5-  85 40     STA  $40
A6A7-  60        RTS
-------------------------------------------------- FIO DRIVER
A6A8-  20 06 AB  JSR  $AB06  CALL FIO
A6AB-  90 16     BCC  $A6C3  OK, EXIT
A6AD-  20 64 A7  JSR  $A764  POINT [$40] → FILE BUFFER
A6B0-  B0 05     BCS  $A6B7  }
A6B2-  A9 00     LDA  #$00   } FORCE FILE / RELEASE BUFFER
A6B4-  A8        TAY         } CLOSED
A6B5-  91 40     STA  ($40),Y}
A6B7-  AD C5 B5  LDA  $B5C5  END OF FILE?
A6BA-  C9 05     CMP  #$05   NO, PRINT ERROR MESSAGE
A6BC-  D0 14     BNE  $A6D2  }
A6BE-  A2 00     LDX  #$00   } PRETEND A X'00'
A6C0-  8E C3 B5  STX  $B5C3  } WAS READ
A6C3-  60        RTS
-------------------------------------------------- MISC. ERRORS
A6C4-  A9 0B     LDA  #$0B   } "COMMAND SYNTAX ERROR"
A6C6-  D0 0A     BNE  $A6D2  }
A6C8-  A9 0C     LDA  #$0C   } "NO FILE BUFFS AVAIL"
A6CA-  D0 06     BNE  $A6D2  }
A6CC-  A9 0E     LDA  #$0E   } "PROGRAM TOO LARGE"
A6CE-  D0 02     BNE  $A6D2  }
A6D0-  A9 0D     LDA  #$0D   } "FILE TYPE MISMATCH"
A6D2-  8D 5C AA  STA  $AA5C  }
-------------------------------------------------- ERROR HANDLER
A6D5-  20 E6 BF  JSR  $BFE6  WARMSTART / CLEAR STATUS
A6D8-  AD B6 AA  LDA  $AAB6  } INT BASIC?
A6DB-  F0 04     BEQ  $A6E1  }
A6DD-  A5 D8     LDA  $D8    FP ON ERROR UNIT ACTIVE?
A6DF-  30 0E     BMI  $A6EF  YES
A6E1-  A2 00     LDX  #$00   } (CR) (BELL) (CR)
A6E3-  20 02 A7  JSR  $A702  }
A6E6-  AE 5C AA  LDX  $AA5C  } PRINT PARTICULAR MSG TEXT
A6E9-  20 02 A7  JSR  $A702  }
A6EC-  20 C8 9F  JSR  $9FC8  (CR)
A6EF-  20 51 A8  JSR  $A851  SET DOS INTERCEPTS
A6F2-  20 5E A6  JSR  $A65E  BASIC RUNNING?
A6F5-  AE 5C AA  LDX  $AA5C  PASS ERROR CODE TO ON ERROR UNIT
A6F8-  A9 03     LDA  #$03
A6FA-  B0 03     BCS  $A6FF  NOT RUNNING, WARMSTART
A6FC-  6C 5A 9D  JMP  ($9D5A) BASIC ERROR ENTRY POINT
A6FF-  6C 5E 9D  JMP  ($9D5E) BASIC WARMSTART
-------------------------------------------------- PRINT ERROR MS
A702-  BD 3F AA  LDA  $AA3F,X} LOCATION OF TEXT
A705-  AA        TAX         } BASED ON MSG #
A706-  8E 63 AA  STX  $AA63
A709-  BD 71 A9  LDA  $A971,X GET A MSG CHARACTER
A70C-  48        PHA         SAVE IT
A70D-  09 80     ORA  #$80   MSB ON FOR PRINTING
A70F-  20 C5 9F  JSR  $9FC5  CSWL CALL TO PRINT IT
A712-  AE 63 AA  LDX  $AA63  } NEXT CHAR
A715-  E8        INX         }
A716-  68        PLA         } LAST?
A717-  10 ED     BPL  $A706  }
```

```
A719-  60          RTS
```

BUILD FIO PARM LIST

```
A71A-  AD 66 AA    LDA  $AA66   } VOL TO PARM2
A71D-  8D BF B5    STA  $B5BF   }
A720-  AD 68 AA    LDA  $AA68   } DRIVE TO PARM2+1
A723-  8D C0 B5    STA  $B5C0   }
A726-  AD 6A AA    LDA  $AA6A   } SLOT TO PARM3
A729-  8D C1 B5    STA  $B5C1   }
A72C-  AD 06 9D    LDA  $9D06   } PRIMARY
A72F-  8D C3 B5    STA  $B5C3   } FILENAME↑ TO PARM4
A732-  AD 07 9D    LDA  $9D07   }
A735-  8D C4 B5    STA  $B5C4   }
A738-  A5 40       LDA  $40     } SAVE BUFFER POINTER
A73A-  8D 4F AA    STA  $AA4F   }
A73D-  A5 41       LDA  $41     }
A73F-  8D 50 AA    STA  $AA50   }
A742-  60          RTS
```

COPY PRIMARY FILENAME TO BUFF

```
A743-  A0 1D       LDY  #$1D          30 CHARS
A745-  B9 75 AA    LDA  $AA75,Y  } COPY FILENAME
A748-  91 40       STA  ($40),Y  }
A74A-  88          DEY                [$40] → BUFFER FILENAME FIELD
A74B-  10 F8       BPL  $A745
A74D-  60          RTS
```

COPY CURRENT BUFF PTRS TO FIO PARMS

```
A74E-  A0 1E       LDY  #$1E          COPY FIOWA↑
A750-  B1 40       LDA  ($40),Y         T/S BUFF↑
A752-  99 A9 B5    STA  $B5A9,Y         DATA BUFF↑
A755-  C8          INY                  NEXT FILE↑
A756-  C0 26       CPY  #$26
A758-  D0 F6       BNE  $A750         TO $B5C7
A75A-  60          RTS
```

RESET STATE TO Ø

```
A75B-  A0 00       LDY  #$00
A75D-  8C 51 AA    STY  $AA51         WARMSTART STATUS
A760-  8C 52 AA    STY  $AA52         STATE = Ø
A763-  60          RTS
```

LOCATE A FILE BUFF.

```
A764-  A9 00       LDA  #$00   } ASSUME NO FREE BUFFS
A766-  85 45       STA  $45    }
A768-  20 92 A7    JSR  $A792     GET FIRST BUFFER
A76B-  4C 73 A7    JMP  $A773
A76E-  20 9A A7    JSR  $A79A     GET NEXT BUFFER
A771-  F0 1D       BEQ  $A790     END OF CHAIN, FILE NOT OPEN
A773-  20 AA A7    JSR  $A7AA     GET 1ST BYTE
A776-  D0 0A       BNE  $A782     OPEN FILE?
A778-  A5 40       LDA  $40    }
A77A-  85 44       STA  $44    } NO, SAVE PTR TO FREE
A77C-  A5 41       LDA  $41    } FILE BUFFER
A77E-  85 45       STA  $45    }
A780-  D0 EC       BNE  $A76E
A782-  A0 1D       LDY  #$1D
A784-  B1 40       LDA  ($40),Y  } PRIMARY FILENAME
A786-  D9 75 AA    CMP  $AA75,Y  } MATCHES THIS BUFFER?
A789-  D0 E3       BNE  $A76E    }
A78B-  88          DEY           }
A78C-  10 F6       BPL  $A784    }
A78E-  18          CLC            FILE LOCATED
A78F-  60          RTS
```

```
A790-  38          SEC            FILE NOT OPEN (44,45↑ FREE BUFFER MAYBE)
A791-  60          RTS
```

RUN DOWN FILE BUFFER CHAIN

```
A792-  AD 00 9D    LDA  $9D00   } FIND FIRST FILE BUFFER
A795-  AE 01 9D    LDX  $9D01   }
A798-  D0 0A       BNE  $A7A4     USE IT FIRST
A79A-  A0 25       LDY  #$25   } GET LINK TO NEXT BUFFER
A79C-  B1 40       LDA  ($40),Y }
A79E-  F0 09       BEQ  $A7A9     END OF CHAIN?
A7A0-  AA          TAX
```

```
A7A1-  88          DEY
A7A2-  B1 40       LDA   ($40),Y
A7A4-  86 41       STX   $41   } SET BUFFER POINTER
A7A6-  85 40       STA   $40   }
A7A8-  8A          TXA          INDICATE OPEN FILE FOUND
A7A9-  60          RTS
```

GET FIRST BYTE OF FILENAME

```
A7AA-  A0 00       LDY   #$00  }
A7AC-  B1 40       LDA   ($40),Y } GET 1ST BYTE
A7AE-  60          RTS
```

TEST CURRENT BUFFER FOR EXEC

```
A7AF-  AD B3 AA    LDA   $AAB3 } EXEC ACTIVE?
A7B2-  F0 0E       BEQ   $A7C2 }
A7B4-  AD B4 AA    LDA   $AAB4 }
A7B7-  C5 40       CMP   $40   } IF SO, IS THE CURRENT
A7B9-  D0 08       BNE   $A7C3 } BUFFER EXEC'S?
A7BB-  AD B5 AA    LDA   $AAB5 }
A7BE-  C5 41       CMP   $41   }
A7C0-  F0 01       BEQ   $A7C3 }
A7C2-  CA          DEX
A7C3-  60          RTS
```

CHECK FILE TYPE

```
A7C4-  4D C2 B5    EOR   $B5C2   FILE TYPE MATCH?
A7C7-  F0 0A       BEQ   $A7D3   YES
A7C9-  29 7F       AND   #$7F    NO, LOCKED BIT OFF
A7CB-  F0 06       BEQ   $A7D3   TRY ONCE MORE
A7CD-  20 EA A2    JSR   $A2EA   GO CLOSE IT
A7D0-  4C D0 A6    JMP   $A6D0   "FILE TYPE MISMATCH"
A7D3-  60          RTS
```

INITIALIZE FILE BUFFERS

```
A7D4-  38          SEC
A7D5-  AD 00 9D    LDA   $9D00 }
A7D8-  85 40       STA   $40   } [$140] → FIRST BUFFER LINK
A7DA-  AD 01 9D    LDA   $9D01 }
A7DD-  85 41       STA   $41   }
A7DF-  AD 57 AA    LDA   $AA57   SET COUNTER TO MAXFILES
A7E2-  8D 63 AA    STA   $AA63
A7E5-  A0 00       LDY   #$00  }
A7E7-  98          TYA         } MARK FILE CLOSED (FILENAME = #Ø)
A7E8-  91 40       STA   ($40),Y }
A7EA-  A0 1E       LDY   #$1E    INDEX PAST FILENAME FIELD TO LINK PTRS
A7EC-  38          SEC
A7ED-  A5 40       LDA   $40
A7EF-  E9 2D       SBC   #$2D
A7F1-  91 40       STA   ($40),Y } SET PTR TO FIO WORKAREA
A7F3-  48          PHA           (45 BYTES BEFORE FILENAME)
A7F4-  A5 41       LDA   $41
A7F6-  E9 00       SBC   #$00
A7F8-  C8          INY
A7F9-  91 40       STA   ($40),Y }
A7FB-  AA          TAX           BACK UP 1 PAGE (256)
A7FC-  CA          DEX
A7FD-  68          PLA
A7FE-  48          PHA
A7FF-  C8          INY
A800-  91 40       STA   ($40),Y } SET PTR TO TRACK/SECTOR LIST BUFF.
A802-  8A          TXA           (256 BYTES BEFORE FIOLWA)
A803-  C8          INY
A804-  91 40       STA   ($40),Y }
A806-  AA          TAX           BACK UP 1 MORE PAGE
A807-  CA          DEX
A808-  68          PLA
A809-  48          PHA
A80A-  C8          INY
A80B-  91 40       STA   ($40),Y } SET PTR TO DATA SECTOR BUFFER
A80D-  C8          INY           (256 BYTES BEFORE T/S LIST)
A80E-  8A          TXA
```

```
A80F-  91 40      STA   ($40),Y
A811-  CE 63 AA   DEC   $AA63      DECREMENT FILES COUNTER
A814-  F0 17      BEQ   $A82D      DONE?
A816-  AA         TAX
A817-  68         PLA              SET LINK FROM THIS FILE BUFF
A818-  38         SEC              TO NEXT
A819-  E9 26      SBC   #$26       (POINTS TO FILENAME FIELD)
A81B-  C8         INY
A81C-  91 40      STA   ($40),Y
A81E-  48         PHA
A81F-  8A         TXA
A820-  E9 00      SBC   #$00
A822-  C8         INY
A823-  91 40      STA   ($40),Y
A825-  85 41      STA   $41
A827-  68         PLA              POSITION TO NEW BUFFER
A828-  85 40      STA   $40
A82A-  4C E5 A7   JMP   $A7E5      AND GO SET IT UP
A82D-  48         PHA
A82E-  A9 00      LDA   #$00
A830-  C8         INY
A831-  91 40      STA   ($40),Y    LINK LAST BUFFER TO Ø
A833-  C8         INY
A834-  91 40      STA   ($40),Y
A836-  AD B6 AA   LDA   $AAB6      INT BASIC?
A839-  F0 0B      BEQ   $A846      YES...
A83B-  68         PLA
A83C-  85 74      STA   $74        SET FP'S HIMEM & STRING START PTRS
A83E-  85 70      STA   $70        TO JUST
A840-  68         PLA              BELOW LAST
A841-  85 73      STA   $73        BUFFER
A843-  85 6F      STA   $6F
A845-  60         RTS              EXIT
A846-  68         PLA
A847-  85 4D      STA   $4D        SET INTS HIMEM & PGM PTR TO JUST
A849-  85 CB      STA   $CB        BELOW LAST
A84B-  68         PLA              BUFFER
A84C-  85 4C      STA   $4C
A84E-  85 CA      STA   $CA
A850-  60         RTS              EXIT
A851-  A5 39      LDA   $39        KSWL STILL ↑DOS
A853-  CD 03 9D   CMP   $9D03      YES - GO ON
A856-  F0 12      BEQ   $A86A
A858-  8D 56 AA   STA   $AA56      SAVE KBD HANDLER EPA
A85B-  A5 38      LDA   $38
A85D-  8D 55 AA   STA   $AA55
A860-  AD 02 9D   LDA   $9D02      INSERT DOS KBD INTERCEPT
A863-  85 38      STA   $38
A865-  AD 03 9D   LDA   $9D03
A868-  85 39      STA   $39
A86A-  A5 37      LDA   $37        CSWL STILL ↑DOS?
A86C-  CD 05 9D   CMP   $9D05      YES - EXIT
A86F-  F0 12      BEQ   $A883
A871-  8D 54 AA   STA   $AA54      SAVE VID HANDLER EPA
A874-  A5 36      LDA   $36
A876-  8D 53 AA   STA   $AA53
A879-  AD 04 9D   LDA   $9D04      INSERT DOS VID INTERCEPT
A87C-  85 36      STA   $36
A87E-  AD 05 9D   LDA   $9D05
A881-  85 37      STA   $37
A883-  60         RTS
A884-  49 4E      EOR   #$4E       COMMAND TEXT TABLE
A886-  49 D4      EOR   #$D4
```

SET DOS KBD/VID I/O INTERCEPTS

```
A888-   4C 4F 41    JMP   $414F
A88B-   C4 53       CPY   $53
A88D-   41 56       EOR   ($56,X)
A88F-   C5 52       CMP   $52
A891-   55 CE       EOR   $CE,X
A893-   43         ???
A894-   48         PHA
A895-   41 49       EOR   ($49,X)
A897-   CE 44 45    DEC   $4544
A89A-   4C 45 54    JMP   $5445
A89D-   C5 4C       CMP   $4C
A89F-   4F         ???
A8A0-   43         ???
A8A1-   CB         ???
A8A2-   55 4E       EOR   $4E,X
A8A4-   4C 4F 43    JMP   $434F
A8A7-   CB         ???
A8A8-   43         ???
A8A9-   4C 4F 53    JMP   $534F
A8AC-   C5 52       CMP   $52
A8AE-   45 41       EOR   $41
A8B0-   C4 45       CPY   $45
A8B2-   58         CLI
A8B3-   45 C3       EOR   $C3
A8B5-   57         ???
A8B6-   52         ???
A8B7-   49 54       EOR   #$54
A8B9-   C5 50       CMP   $50
A8BB-   4F         ???
A8BC-   53         ???
A8BD-   49 54       EOR   #$54
A8BF-   49 4F       EOR   #$4F
A8C1-   CE 4F 50    DEC   $504F
A8C4-   45 CE       EOR   $CE
A8C6-   41 50       EOR   ($50,X)
A8C8-   50 45       BVC   $A90F
A8CA-   4E C4 52    LSR   $52C4
A8CD-   45 4E       EOR   $4E
A8CF-   41 4D       EOR   ($4D,X)
A8D1-   C5 43       CMP   $43
A8D3-   41 54       EOR   ($54,X)
A8D5-   41 4C       EOR   ($4C,X)
A8D7-   4F         ???
A8D8-   C7         ???
A8D9-   4D 4F CE    EOR   $CE4F
A8DC-   4E 4F 4D    LSR   $4D4F
A8DF-   4F         ???
A8E0-   CE 50 52    DEC   $5250
A8E3-   A3         ???
A8E4-   49 4E       EOR   #$4E
A8E6-   A3         ???
A8E7-   4D 41 58    EOR   $5841
A8EA-   46 49       LSR   $49
A8EC-   4C 45 D3    JMP   $D345
A8EF-   46 D0       LSR   $D0
A8F1-   49 4E       EOR   #$4E
A8F3-   D4         ???
A8F4-   42         ???
A8F5-   53         ???
A8F6-   41 56       EOR   ($56,X)
A8F8-   C5 42       CMP   $42
A8FA-   4C 4F 41    JMP   $414F
A8FD-   C4 42       CPY   $42
```

MSB ON

49 4E 49 D4

I N I T

etc.

COMMAND TEXT TABLE

↓

A8D2

```
A8FF-  52          ???
A900-  55 CE       EOR   $CE,X
A902-  56 45       LSR   $45,X
A904-  52          ???
A905-  49 46       EOR   #$46
A907-  D9 00 21    CMP   $2100,Y
A90A-  70 A0       BVS   $A8AC
A90C-  70 A1       BVS   $A8AF
A90E-  70 A0       BVS   $A8B0
A910-  70 20       BVS   $A932
A912-  70 20       BVS   $A934
A914-  70 20       BVS   $A936
A916-  70 20       BVS   $A938
A918-  70 60       BVS   $A97A
A91A-  00          BRK
A91B-  22          ???
A91C-  06 20       ASL   $20
A91E-  74          ???
A91F-  22          ???
A920-  06 22       ASL   $22
A922-  04          ???
A923-  23          ???
A924-  78          SEI
A925-  22          ???
A926-  70 30       BVS   $A958
A928-  70 40       BVS   $A96A
A92A-  70 40       BVS   $A96C
A92C-  80          ???
A92D-  40          RTI
A92E-  80          ???
A92F-  08          PHP
A930-  00          BRK
A931-  08          PHP
A932-  00          BRK
A933-  04          ???
A934-  00          BRK
A935-  40          RTI
A936-  70 40       BVS   $A978
A938-  00          BRK
A939-  21 79       AND   ($79,X)
A93B-  20 71 20    JSR   $2071
A93E-  71 20       ADC   ($20),Y
A940-  70 D6       BVS   $A918
A942-  C4 D3       CPY   $D3
A944-  CC D2 C2    CPY   $C2D2
A947-  C1 C3       CMP   ($C3,X)
A949-  C9 CF       CMP   #$CF
A94B-  40          RTI
A94C-  20 10 08    JSR   $0810
A94F-  04          ???
A950-  02          ???
A951-  01 C0       ORA   ($C0,X)
A953-  A0 90       LDY   #$90
A955-  00          BRK
A956-  00          BRK
A957-  FE 00 01    INC   $0100,X
A95A-  00          BRK
A95B-  02          ???
A95C-  00          BRK
A95D-  01 00       ORA   ($00,X)
A95F-  07          ???
A960-  00          BRK
A961-  01 00       ORA   ($00,X)
```

COMMAND VALID PARMS TABLE

0	INIT	2170
2	LOAD	A070
4	SAVE	A170
6	RUN	A070
8	CHAIN	2070
10	DELETE	2070
12	LOCK	2070
14	UNLOCK	2070
16	CLOSE	6000
18	READ	2206
20	EXEC	2074
22	WRITE	2206
24	POSITION	2204
26	OPEN	2378
28	APPEND	2270
30	RENAME	3070
32	CATALOG	4070
34	MON	4080
36	NOMON	4080
38	PR#	0800
40	IN#	0800
42	MAXFILES	0400
44	FP	4070
46	INT	4000
48	BSAVE	2179
50	BLOAD	2071
52	BRUN	2071
54	VERIFY	2070

BIT	OPERAND
0	FILENAME OPT.
1	NO POSITIONAL OP.
2	FILENAME #1
3	FILENAME #2
4	slot #
5	Maxfiles #
*6	deferred cmd.
*7	create new file
8	C, I, O
9	V - Volume #
10	D - Drive
11	S - Slot
12	L - Length
13	R - Record #
14	B - Byte
15	A - Address

KEYWORD NAME TABLE

"V","D","S","L","R","B","A",
"C","I","O"

KEYWORD BIT POSITION TABLE

V-40	B-02		
D-20	A-01		
S-10	C-C0	NO NUMERIC OPERAND	
L-08	I-A0		
R-04	O-90		

KEYWORD VALID RANGE TABLE

	MIN	MAX
V	0	254
D	1	2
S	1	7
L	1	32767
R	0	32767

```
A963-  FF          ???
A964-  7F          ???
A965-  00          BRK
A966-  00          BRK
A967-  FF          ???
A968-  7F          ???
A969-  00          BRK
A96A-  00          BRK
A96B-  FF          ???
A96C-  7F          ???
A96D-  00          BRK
A96E-  00          BRK
A96F-  FF          ???
A970-  FF          ???
A971-  0D 07 8D    ORA   $8D07
A974-  4C 41 4E    JMP   $4E41
A977-  47          ???
A978-  55 41       EOR   $41,X
A97A-  47          ???
A97B-  45 20       EOR   $20
A97D-  4E 4F 54    LSR   $544F
A980-  20 41 56    JSR   $5641
A983-  41 49       EOR   ($49,X)
A985-  4C 41 42    JMP   $4241
A988-  4C C5 52    JMP   $52C5
A98B-  41 4E       EOR   ($4E,X)
A98D-  47          ???
A98E-  45 20       EOR   $20
A990-  45 52       EOR   $52
A992-  52          ???
A993-  4F          ???
A994-  D2          ???
A995-  57          ???
A996-  52          ???
A997-  49 54       EOR   #$54
A999-  45 20       EOR   $20
A99B-  50 52       BVC   $A9EF
A99D-  4F          ???
A99E-  54          ???
A99F-  45 43       EOR   $43
A9A1-  54          ???
A9A2-  45 C4       EOR   $C4
A9A4-  45 4E       EOR   $4E
A9A6-  44          ???
A9A7-  20 4F 46    JSR   $464F
A9AA-  20 44 41    JSR   $4144
A9AD-  54          ???
A9AE-  C1 46       CMP   ($46,X)
A9B0-  49 4C       EOR   #$4C
A9B2-  45 20       EOR   $20
A9B4-  4E 4F 54    LSR   $544F
A9B7-  20 46 4F    JSR   $4F46
A9BA-  55 4E       EOR   $4E,X
A9BC-  C4 56       CPY   $56
A9BE-  4F          ???
A9BF-  4C 55 4D    JMP   $4D55
A9C2-  45 20       EOR   $20
A9C4-  4D 49 53    EOR   $5349
A9C7-  4D 41 54    EOR   $5441
A9CA-  43          ???
A9CB-  C8          INY
A9CC-  49 2F       EOR   #$2F
A9CE-  4F          ???
```

B	Ø	32767
A	Ø	65535

C, I, O not in this table since they do not have numeric values.

MESSAGE TEXT TABLE

MSG #	TEXT
Ø	"(CR)(BEL)(CR)"
1	"LANGUAGE NOT AVAILABLE"
2 *	"RANGE ERROR"
3 *	"RANGE ERROR"
4	"WRITE PROTECTED"
5	"END OF DATA"
6	"FILE NOT FOUND"
7	"VOLUME MISMATCH"
8	"I/O ERROR"
9	"DISK FULL"
10	"FILE LOCKED"
11	"SYNTAX ERROR"
12	"NO BUFFERS AVAILABLE"
13	"FILE TYPE MISMATCH"
14	"PROGRAM TOO LARGE"
15	"NOT DIRECT COMMAND"

*2 - BAD FIO OPCODE

3 - BAD FIO SUBCODE

```
A9CF-  20 45 52   JSR  $5245
A9D2-  52         ???
A9D3-  4F         ???
A9D4-  D2         ???
A9D5-  44         ???
A9D6-  49 53      EOR  #$53
A9D8-  4B         ???
A9D9-  20 46 55   JSR  $5546
A9DC-  4C CC 46   JMP  $46CC
A9DF-  49 4C      EOR  #$4C
A9E1-  45 20      EOR  $20
A9E3-  4C 4F 43   JMP  $434F
A9E6-  4B         ???
A9E7-  45 C4      EOR  $C4
A9E9-  53         ???
A9EA-  59 4E 54   EOR  $544E,Y
A9ED-  41 58      EOR  ($58,X)
A9EF-  20 45 52   JSR  $5245
A9F2-  52         ???
A9F3-  4F         ???
A9F4-  D2         ???
A9F5-  4E 4F 20   LSR  $204F
A9F8-  42         ???
A9F9-  55 46      EOR  $46,X
A9FB-  46 45      LSR  $45
A9FD-  52         ???
A9FE-  53         ???
A9FF-  20 41 56   JSR  $5641
AA02-  41 49      EOR  ($49,X)
AA04-  4C 41 42   JMP  $4241
AA07-  4C C5 46   JMP  $46C5
AA0A-  49 4C      EOR  #$4C
AA0C-  45 20      EOR  $20
AA0E-  54         ???
AA0F-  59 50 45   EOR  $4550,Y
AA12-  20 4D 49   JSR  $494D
AA15-  53         ???
AA16-  4D 41 54   EOR  $5441
AA19-  43         ???
AA1A-  C8         INY
AA1B-  50 52      BVC  $AA6F
AA1D-  4F         ???
AA1E-  47         ???
AA1F-  52         ???
AA20-  41 4D      EOR  ($4D,X)
AA22-  20 54 4F   JSR  $4F54
AA25-  4F         ???
AA26-  20 4C 41   JSR  $414C
AA29-  52         ???
AA2A-  47         ???
AA2B-  C5 4E      CMP  $4E
AA2D-  4F         ???
AA2E-  54         ???
AA2F-  20 44 49   JSR  $4944
AA32-  52         ???
AA33-  45 43      EOR  $43
AA35-  54         ???
AA36-  20 43 4F   JSR  $4F43
AA39-  4D 4D 41   EOR  $414D
AA3C-  4E C4 8D   LSR  $8DC4
AA3F-  00         BRK
AA40-  03         ???
AA41-  19 19 24   ORA  $2419,Y
```

MESSAGE TEXT TABLE

MSG # TEXT INDEX TABLE

```
AA44-   33              ???
AA45-   3E 4C 5B        ROL     $5B4C,X
AA48-   64              ???
AA49-   6D 78 84        ADC     $8478
AA4C-   98              TYA
AA4D-   AA              TAX
AA4E-   BB              ???
AA4F-   2D 98 00        AND     $0098
AA52-   03              ???
AA53-   F0 FD           BEQ     $AA52
AA55-   1B              ???
AA56-   FD 03 03        SBC     $0303,X
AA59-   F7              ???
AA5A-   00              BRK
AA5B-   01 A0           ORA     ($A0,X)
AA5D-   04              ???
AA5E-   00              BRK
AA5F-   1A              ???
AA60-   9F              ???
AA61-   00              BRK
AA62-   00              BRK
AA63-   CC 00 00        CPY     $0000
AA66-   00 V            BRK
AA67-   00              BRK
AA68-   01 00 D         ORA     ($00,X)
AA6A-   07 S            ???
AA6B-   00              BRK
AA6C-   01 00 L         ORA     ($00,X)
AA6E-   00 R            BRK
AA6F-   00              BRK
AA70-   00 B            BRK
AA71-   00              BRK
AA72-   00 A            BRK
AA73-   00              BRK
AA74-   00 MON          BRK
AA75-   C8              INY
AA76-   C5 CC           CMP     $CC
AA78-   CC CF A0        CPY     $A0CF
AA7B-   A0 A0           LDY     #$A0
AA7D-   A0 A0           LDY     #$A0
AA7F-   A0 A0           LDY     #$A0
AA81-   A0 A0           LDY     #$A0
AA83-   A0 A0           LDY     #$A0
AA85-   A0 A0           LDY     #$A0
AA87-   A0 A0           LDY     #$A0
AA89-   A0 A0           LDY     #$A0
AA8B-   A0 A0           LDY     #$A0
AA8D-   A0 A0           LDY     #$A0
AA8F-   A0 A0           LDY     #$A0
AA91-   A0 A0           LDY     #$A0
AA93-   A0 A0           LDY     #$A0
AA95-   A0 A0           LDY     #$A0
AA97-   A0 A0           LDY     #$A0
AA99-   A0 A0           LDY     #$A0
AA9B-   A0 A0           LDY     #$A0
AA9D-   A0 A0           LDY     #$A0
AA9F-   A0 A0           LDY     #$A0
AAA1-   A0 A0           LDY     #$A0
AAA3-   A0 A0           LDY     #$A0
AAA5-   A0 A0           LDY     #$A0
AAA7-   A0 A0           LDY     #$A0
AAA9-   A0 A0           LDY     #$A0
AAAB-   A0 A0           LDY     #$A0
```

AA4F: CURRENT BUFFER ADDRESS
AA51: STATUS FLAGS- { Ø1: READ STATE; ØØ: WARMSTART; 8Ø: COLDSTART; 4Ø: FP RAM }
AA52: CSWL STATE
AA53: TRUE VID HANDLER EP
AA55: TRUE KBD HANDLER EP
AA57: MAXFILES
AA59: { S, X, Y, A REGISTER SAVE DURING
To AA5C: { KBD/VID INTERCEPT
AA5D: LINE INDEX
AA5E: "MON" FLAGS (C, I, O: 40, 20, 10)
AA5F: LAST COMMAND INDEX #2
AA60: RANGE LENGTH FOR LOADS
AA62: PENDING CMD #
AA64: KEYWORD INDEX #
AA63: BUFFER INIT COUNTER / etc. MSG INDEX
AA65: BITS FOR KEYWORDS PARSED

KEYWORD VALUES

(V)OLUME #
(D)RIVE #
(S)LOT #
(L)ENGTH
(R)ECORD #
(B)YTE
(A)DDRESS
MON C,I and/or O (40=C, 20=I, 10=O)

← 9DØ6

PRIMARY FILENAME
(INITIALLY CONTAINS GREETING FILENAME)

SECONDARY (RENAME) FILENAME

```
AAAD-  A0 A0        LDY  #$A0
AAAF-  A0 A0        LDY  #$A0
AAB1-  03           ???
AAB2-  84 00        STY  $00        MAXFILES DEFAULT
                                    "CTL-D"/ EXEC FILE ACTIVE FLAG (¬Ø)
AAB4-  00           BRK             } ↑EXEC BUFF
AAB5-  00           BRK             BASIC ACTIVE { ØØ - INT
AAB6-  00           BRK                          { 4Ø - FP ROM
AAB7-  00           BRK             RUN FLAG     { 8Ø - FP RAM
AAB8-  C1 D0        CMP  ($D0,X)    }
AABA-  D0 CC        BNE  $AA88      } "APPLESOFT"
AABC-  C5 D3        CMP  $D3        }
AABE-  CF           ???             }
AABF-  C6 D4        DEC  $D4        }
AAC1-  E8           INX             } ADDRESS OF RWTS PARMLIST
AAC2-  B7           ???             }
AAC3-  BB           ???             } VTOC SECTOR BUFFER ↑
AAC4-  B3           ???             }
AAC5-  BB           ???             } DIRECTORY SECTOR BUFFER ↑
AAC6-  B4 00        LDY  $00,X      } END OF DOS ↑
AAC8-  C0 7E        CPY  #$7E
AACA-  B3           ???
AACB-  21 AB        AND  ($AB,X)
AACD-  05 AC        ORA  $AC
AACF-  57           ???
AAD0-  AC 6F AC     LDY  $AC6F
AAD3-  2A           ROL
AAD4-  AD 97 AD     LDA  $AD97
AAD7-  EE AC F5     INC  $F5AC
AADA-  AC 39 AC     LDY  $AC39
AADD-  11 AD        ORA  ($AD),Y
AADF-  8D AE 17     STA  $17AE
AAE2-  AD 7E B3     LDA  $B37E
AAE5-  7E B3 89     ROR  $89B3,X
AAE8-  AC 95 AC     LDY  $AC95
AAEB-  86 AC        STX  $AC
AAED-  92           ???
AAEE-  AC 7E B3     LDY  $B37E
AAF1-  7E B3 BD     ROR  $BDB3,X
AAF4-  AC C9 AC     LDY  $ACC9
AAF7-  BA           TSX
AAF8-  AC C6 AC     LDY  $ACC6
*AAFB- 7E B3 E0
*AAFE- 00           CPX  #$ØØ       X REG =Ø?
*AAFF- F0 02        BEQ  $AB03      IF SO, ALLOW NEW FILES
*AB01- A2 02        LDX  #$02       IF NOT, DISALLOW
*AB03- 8E 5F AA     STX  $AA5F      BY SETTING LAST CMD INDEX ACCORDINGLY
AB06-  BA           TSX
AB07-  8E 9B B3     STX  $B39B      } SAVE STACK PTR
AB0A-  20 6A AE     JSR  $AE6A      RESTORE FIOWA FROM BUFF
AB0D-  AD BB B5     LDA  $B5BB      GET DESIRED OPERATION
AB10-  C9 0D        CMP  #$0D       } <13? NO RC=2
AB12-  B0 0B        BCS  $AB1F      }
AB14-  0A           ASL             }
AB15-  AA           TAX             }
AB16-  BD CA AA     LDA  $AACA,X    } FIND OPERATION HANDLER
AB19-  48           PHA             }     ROUTINE
AB1A-  BD C9 AA     LDA  $AAC9,X    }
AB1D-  48           PHA             }
AB1E-  60           RTS             GO TO IT
AB1F-  4C 63 B3     JMP  $B363      RC=2 / BAD OPCODE
AB22-  20 28 AB     JSR  $AB28      OPEN FILE
AB25-  4C 7F B3     JMP  $B37F      EXIT
AB28-  20 DC AB     JSR  $ABDC      INITIALIZE FIOWA
```

FIO FUNCTION ROUTINE TABLE

```
Ø - B37F  NOP
1 - AB22  OPEN
2 - AC06  CLOSE
3 - AC58  READ
4 - AC7Ø  WRITE
5 - AD2B  DELETE
6 - AD98  CATALOG
7 - ACEF  LOCK
8 - ACF6  UNLOCK
9 - AC3A  RENAME
10 - AD12 POSITION
11 - AE8E INIT
12 - AD18 VERIFY
13 - B37F NOP
```

READ SUBCODE HANDLER TABL

```
0 - B37F  NOP
1 - AC8A  READ 1 BYTE
2 - AC96  READ RANGE
3 - AC87  POSITION/READ1
4 - AC93  POSITION/READ RANGE
5 - B37F  NOP
```

WRITE SUBCODE HANDLER TABLE

```
0 - B37F  NOP
1 - ACBE  WRITE 1 BYTE
2 - ACCA  WRITE RANGE
3 - AC8B  POSITION/WRITE 1
4 - ACC7  POSITION/WRITE RANGE
5 - B37F  NOP
```

FIO EXTERNAL ENTRY

FIO

DOS FILE MANAGER

OPEN

```
AB2B-  A9 01     LDA  #$01    } SET SECTOR LENGTH TO 256
AB2D-  8D E3 B5  STA  $B5E3   }
AB30-  AE BE B5  LDX  $B5BE   } GET RECORD LENGTH
AB33-  AD BD B5  LDA  $B5BD   }
AB36-  D0 05     BNE  $AB3D   }
AB38-  E0 00     CPX  #$00    } IS IT NON-ZERO?
AB3A-  D0 01     BNE  $AB3D   }
AB3C-  E8        INX          IF NOT, FORCE IT TO 1
AB3D-  8D E8 B5  STA  $B5E8   } SET IT IN FIOWA
AB40-  8E E9 B5  STX  $B5E9   }
AB43-  20 C9 B1  JSR  $B1C9   LOCATE/ALLOCATE DIRECTORY ENTRY
AB46-  90 5E     BCC  $ABA6   FILE ALREADY EXISTS?
AB48-  8E 9C B3  STX  $B39C   SAVE DIRECTORY INDEX
*AB4B- AE 5F AA  LDX  $AA5F   GET LAST CMD ENTERED INDEX
*AB4E- BD 09 A9  LDA  $A909,X VALID KEYWORDS
*AB51- AE 9C B3  LDX  $B39C   RESTORE DIRECTORY INDEX
*AB54- 4A        LSR          } INIT, SAVE, OPEN, or BSAVE/IF SO, OK
*AB55- B0 0D     BCS  $AB64   }
*AB57- AD 51 AA  LDA  $AA51   } RUNNING "APPLESOFT"?
*AB5A- C9 C0     CMP  #$C0    }
*AB5C- D0 03     BNE  $AB61   }
*AB5E- 4C 5F B3  JMP  $B35F   } YES, "LANGUAGE NOT AVAILABLE"
*AB61- 4C 73 B3  JMP  $B373   } NO, "FILE NOT FOUND"
AB64-  A9 00     LDA  #$00    }
AB66-  9D E8 B4  STA  $B4E8,X } SET SECTOR COUNT TO ONE
AB69-  A9 01     LDA  #$01    }   (T/S LIST SECTOR ONLY)
AB6B-  9D E7 B4  STA  $B4E7,X }
AB6E-  8E 9C B3  STX  $B39C   SAVE DIRECTORY INDEX
AB71-  20 44 B2  JSR  $B244   ALLOCATE A SECTOR FOR T/S LIST
AB74-  AE 9C B3  LDX  $B39C   RESTORE INDEX
AB77-  9D C7 B4  STA  $B4C7,X SET SECTOR NO. IN DIRECTORY ENTRY
AB7A-  8D D2 B5  STA  $B5D2   } AND IN FIOWA (1ST & CURR)
AB7D-  8D D4 B5  STA  $B5D4   }
AB80-  AD F1 B5  LDA  $B5F1   }
AB83-  9D C6 B4  STA  $B4C6,X } TRACK TO DIRECTORY
AB86-  8D D1 B5  STA  $B5D1   } AND FIOWA
AB89-  8D D3 B5  STA  $B5D3   }
AB8C-  AD C2 B5  LDA  $B5C2   }
AB8F-  9D C8 B4  STA  $B4C8,X } FILETYPE TO DIRECTORY ENTRY
AB92-  20 37 B0  JSR  $B037   WRITE BACK DIRECTORY SECTOR
AB95-  20 0C AF  JSR  $AF0C   POINT TO TRACK/SECTOR LIST BUFFER
AB98-  20 D6 B7  JSR  $B7D6   ZERO IT
AB9B-  20 3A AF  JSR  $AF3A   WRITE IT OUT
AB9E-  AE 9C B3  LDX  $B39C   DIRECTORY INDEX AGAIN
ABA1-  A9 06     LDA  #$06    } "FILE NOT FOUND" (WAS CREATED) RC=6
ABA3-  8D C5 B5  STA  $B5C5   }
ABA6-  BD C6 B4  LDA  $B4C6,X }
ABA9-  8D D1 B5  STA  $B5D1   } T/S OF TRACK/SECTOR LIST TO
ABAC-  BD C7 B4  LDA  $B4C7,X }   1ST T/S LIST ↑ IN FIOWA
ABAF-  8D D2 B5  STA  $B5D2   }
ABB2-  BD C8 B4  LDA  $B4C8,X } PASS BACK FILETYPE IN PARM LIST
ABB5-  8D C2 B5  STA  $B5C2   }
ABB8-  8D F6 B5  STA  $B5F6     AND IN FIOWA
ABBB-  BD E7 B4  LDA  $B4E7,X }
ABBE-  8D EE B5  STA  $B5EE   } COPY NO. OF SECTORS IN FILE
ABC1-  BD E8 B4  LDA  $B4E8,X } FROM DIRECTORY TO FIOWA
ABC4-  8D EF B5  STA  $B5EF   }
ABC7-  8E D9 B5  STX  $B5D9     DIRECTORY OFFSET TO FIOWA
ABCA-  A9 FF     LDA  #$FF    }
ABCC-  8D E0 B5  STA  $B5E0   } END OF DATA PTR TO
ABCF-  8D E1 B5  STA  $B5E1   }   INFINITY (ALMOST!)
ABD2-  AD E2 B3  LDA  $B3E2   }
ABD5-  8D DA B5  STA  $B5DA   } NUMBER OF DATA BYTES REPRESENTED BY
                              ONE T/S LIST SECTOR (122*256) 30.5K
```

NEW FILE

OLD FILE

```
ABD8-  18           CLC
ABD9-  4C 5E AF     JMP   $AF5E     } INITIALIRE TO FIRST T/S LIST IN FILE
-------------------------------------------------------------------------
ABDC-  A9 00        LDA   #$00
ABDE-  AA           TAX
ABDF-  9D D1 B5     STA   $B5D1,X   } ZERO 45 BYTE WORKAREA
ABE2-  E8           INX
ABE3-  E0 2D        CPX   #$2D
ABE5-  D0 F8        BNE   $ABDF
ABE7-  AD BF B5     LDA   $B5BF     GET VOLUME #
ABEA-  49 FF        EOR   #$FF      COMPLIMENT
ABEC-  8D F9 B5     STA   $B5F9     SAVE FOR COMPARISONS
ABEF-  AD C0 B5     LDA   $B5C0     } DRIVE
ABF2-  8D F8 B5     STA   $B5F8     }
ABF5-  AD C1 B5     LDA   $B5C1
ABF8-  0A           ASL
ABF9-  0A           ASL
ABFA-  0A           ASL             } SLOT*16
ABFB-  0A           ASL
ABFC-  AA           TAX
ABFD-  8E F7 B5     STX   $B5F7
AC00-  A9 11        LDA   #$11      } TRACK=17 (CATALOG TRACK)
AC02-  8D FA B5     STA   $B5FA     }
AC05-  60           RTS
-------------------------------------------------------------------------
AC06-  20 1D AF     JSR   $AF1D     } CHECKPOINT DATA BUFFER
AC09-  20 34 AF     JSR   $AF34     } AND T/S LIST BUFFER
AC0C-  20 C3 B2     JSR   $B2C3     } RELEASE PREALLOCATED SECTORS
AC0F-  A9 02        LDA   #$02
AC11-  2D D5 B5     AND   $B5D5     } VTOC NEEDS REREADING?
AC14-  F0 21        BEQ   $AC37     } NO
AC16-  20 F7 AF     JSR   $AFF7     YES, GO DO IT
AC19-  A9 00        LDA   #$00
AC1B-  18           CLC
AC1C-  20 11 B0  ↱  JSR   $B011     } FLUSH THRU DIRECTORY SECTORS
AC1F-  38        |  SEC              } TO THE ONE DESCRIBING THIS FILE
AC20-  CE D8 B5  |  DEC   $B5D8
AC23-  D0 F7     |  BNE   $AC1C
AC25-  AE D9 B5  |  LDX   $B5D9     GET OFFSET IN DIRECTORY SECTOR
AC28-  AD EE B5  |  LDA   $B5EE
AC2B-  9D E7 B4  |  STA   $B4E7,X   } UPDATE SECTOR COUNT
AC2E-  AD EF B5  |  LDA   $B5EF     }
AC31-  9D E8 B4  |  STA   $B4E8,X   }
AC34-  20 37 B0  |  JSR   $B037     WRITE IT BACK TO DISK
AC37-  4C 7F B3  ↳  JMP   $B37F     EXIT
-------------------------------------------------------------------------
AC3A-  20 28 AB     JSR   $AB28     LOCATE/OPEN FILE
AC3D-  AD F6 B5     LDA   $B5F6     } FILE LOCKED?
AC40-  30 2B        BMI   $AC6D     }
AC42-  AD BD B5     LDA   $B5BD
AC45-  85 42        STA   $42       } [$42] → NEW NAME
AC47-  AD BE B5     LDA   $B5BE     }
AC4A-  85 43        STA   $43       }
AC4C-  AE 9C B3     LDX   $B39C     DIRECTORY INDEX
AC4F-  20 1C B2     JSR   $B21C     COPY NEW NAME TO DIRECTORY
AC52-  20 37 B0     JSR   $B037     WRITE DIRECTORY
AC55-  4C 7F B3     JMP   $B37F     EXIT
-------------------------------------------------------------------------
AC58-  AD BC B5     LDA   $B5BC     } SUBCODE ≥ 5? INVALID IF SO
AC5B-  C9 05        CMP   #$05      }
AC5D-  B0 0B        BCS   $AC6A     }
AC5F-  0A           ASL             *2 FOR INDEX
AC60-  AA           TAX
AC61-  BD E6 AA     LDA   $AAE6,X   } DETERMINE SUB-HANDLER ROUTINE
AC64-  48           PHA             }
AC65-  BD E5 AA     LDA   $AAE5,X   }
AC68-  48           PHA             }
```

INITIALIZE FIO WORKAREA

CLOSE

RENAME

READ

```
AC69-   60          RTS                 GO TO IT
AC6A-   4C 67 B3    JMP   $B367         RC=3  SUBCODE BAD
AC6D-   4C 7B B3    JMP   $B37B         "FILE LOCKED"
AC70-   AD F6 B5    LDA   $B5F6         } LOCKED?                          WRITE
AC73-   30 F8       BMI   $AC6D         }
AC75-   AD BC B5    LDA   $B5BC         }
AC78-   C9 05       CMP   #$05          } SUBCODE VALID? (NOT ≥5)
AC7A-   B0 EE       BCS   $AC6A         }
AC7C-   0A          ASL                 *2 FOR INDEX
AC7D-   AA          TAX
AC7E-   BD F2 AA    LDA   $AAF2,X       }
AC81-   48          PHA                 } DETERMINE SUB-HANDLER
AC82-   BD F1 AA    LDA   $AAF1,X       }        ROUTINE
AC85-   48          PHA                 }
AC86-   60          RTS                 GO TO IT
AC87-   20 00 B3    JSR   $B300         POSITION                           READ ONE
AC8A-   20 A8 AC    JSR   $ACA8         READ NEXT BYTE                       BYTE
AC8D-   8D C3 B5    STA   $B5C3         PASS BACK IN PARM LIST
AC90-   4C 7F B3    JMP   $B37F         EXIT
AC93-   20 00 B3    JSR   $B300         POSITION                           READ A
AC96-   20 B5 B1    JSR   $B1B5         DEC & CHECK LENGTH                   RANGE OF
AC99-   20 A8 AC    JSR   $ACA8         READ A BYTE                          BYTES
AC9C-   48          PHA                 SAVE IT
AC9D-   20 A2 B1    JSR   $B1A2         POINT TO DATA AREA
ACA0-   A0 00       LDY   #$00          }
ACA2-   68          PLA                 } STORE BYTE READ
ACA3-   91 42       STA   ($42),Y       }
ACA5-   4C 96 AC    JMP   $AC96         CONTINUE
ACA8-   20 B6 B0    JSR   $B0B6         READ A BYTE
ACAB-   B0 0B       BCS   $ACB8         END OF DATA?
ACAD-   B1 42       LDA   ($42),Y       } SAVE IT
ACAF-   48          PHA                 }
ACB0-   20 5B B1    JSR   $B15B         INCREMENT RECORD #/BYTE OFFSET
ACB3-   20 94 B1    JSR   $B194         INCREMENT FILE OFFSET
ACB6-   68          PLA                 } RETURN WITH DATA READ
ACB7-   60          RTS
ACB8-   4C 6F B3    JMP   $B36F         "END OF DATA"
ACBB-   20 00 B3    JSR   $B300         POSITION                           WRITE ONE
ACBE-   AD C3 B5    LDA   $B5C3         GET DATA TO WRITE                    BYTE
ACC1-   20 DA AC    JSR   $ACDA         GO DO IT
ACC4-   4C 7F B3    JMP   $B37F         AND EXIT
ACC7-   20 00 B3    JSR   $B300         POSITION                           WRITE A
ACCA-   20 A2 B1    JSR   $B1A2         COPY AND ADVANCE ADDR                RANGE OF
ACCD-   A0 00       LDY   #$00          } GET BYTE TO WRITE                  BYTES
ACCF-   B1 42       LDA   ($42),Y       }
ACD1-   20 DA AC    JSR   $ACDA         GO WRITE IT
ACD4-   20 B5 B1    JSR   $B1B5         CHECK & DECREMENT LENGTH
ACD7-   4C CA AC    JMP   $ACCA         CONTINUE
ACDA-   48          PHA                 SAVE DATA
ACDB-   20 B6 B0    JSR   $B0B6         GO READ PROPER SECTOR
ACDE-   68          PLA                 } STORE BYTE TO BE WRITTEN
ACDF-   91 42       STA   ($42),Y       }
ACE1-   A9 40       LDA   #$40          }
ACE3-   0D D5 B5    ORA   $B5D5         } FLAG DATA BUFF AS NEEDING CHECKPOIN
ACE6-   8D D5 B5    STA   $B5D5         }
ACE9-   20 5B B1    JSR   $B15B         INCREMENT RECORD #/BYTE OFFSET
ACEC-   4C 94 B1    JMP   $B194         EXIT VIA FILE OFFSET INCREMENT
ACEF-   A9 80       LDA   #$80          } SET MASK TO LOCK                 LOCK
ACF1-   8D 9E B3    STA   $B39E         }
ACF4-   D0 05       BNE   $ACFB         COMMON CODE
ACF6-   A9 00       LDA   #$00          } SET MASK TO UNLOCK               UNLOCK
ACF8-   8D 9E B3    STA   $B39E         }
ACFB-   20 28 AB    JSR   $AB28         OPEN FILE
```

```
ACFE-  AE 9C B3   LDX  $B39C      GET DIRECTORY INDEX
AD01-  BD C8 B4   LDA  $B4C8,X  }
AD04-  29 7F      AND  #$7F     } UPDATE FILE TYPE TO LOCK - 80
AD06-  0D 9E B3   ORA  $B39E        OR
AD09-  9D C8 B4   STA  $B4C8,X    UNLOCK - 780
AD0C-  20 37 B0   JSR  $B037      WRITE DIRECTORY SECTOR
AD0F-  4C 7F B3   JMP  $B37F      EXIT
-------------------------------------------------------------- POSITION
AD12-  20 00 B3   JSR  $B300      POSITION
AD15-  4C 7F B3   JMP  $B37F      EXIT
-------------------------------------------------------------- VERIFY
AD18-  20 28 AB   JSR  $AB28      OPEN FILE
AD1B-  20 B6 B0   JSR  $B0B6      READ NEXT DATA SECTOR
AD1E-  B0 EF      BCS  $AD0F      END OF FILE
AD20-  EE E4 B5   INC  $B5E4    }
AD23-  D0 F6      BNE  $AD1B    } INC SECTOR POSITION
AD25-  EE E5 B5   INC  $B5E5    }
AD28-  4C 1B AD   JMP  $AD1B      CONTINUE
-------------------------------------------------------------- DELETE
AD2B-  20 28 AB   JSR  $AB28      OPEN FILE
AD2E-  AE 9C B3   LDX  $B39C      DIRECTORY INDEX
AD31-  BD C8 B4   LDA  $B4C8,X  } LOCKED?
AD34-  10 03      BPL  $AD39    }
AD36-  4C 7B B3   JMP  $B37B      "FILE LOCKED"
AD39-  AE 9C B3   LDX  $B39C      DIRECTORY INDEX
AD3C-  BD C6 B4   LDA  $B4C6,X    GET TRACK FOR 1ST T/S LIST
AD3F-  8D D1 B5   STA  $B5D1      SET IT IN FIOWA
AD42-  9D E6 B4   STA  $B4E6,X    SAVE AT END OF FILENAME
AD45-  A9 FF      LDA  #$FF     } MARK FILE DELETED IN DIRECTORY
AD47-  9D C6 B4   STA  $B4C6,X  }
AD4A-  BC C7 B4   LDY  $B4C7,X  } SECTOR OF 1ST T/S LIST TO FIOWA
AD4D-  8C D2 B5   STY  $B5D2    }
AD50-  20 37 B0   JSR  $B037      WRITE DIRECTORY SECTOR BACK
AD53-  18         CLC           }
AD54-  20 5E AF   JSR  $AF5E    } FIND FIRST T/S LIST SECTOR
AD57-  B0 2A      BCS  $AD83    }
AD59-  20 0C AF   JSR  $AF0C      SELECT T/S LIST BUFFER
AD5C-  A0 0C      LDY  #$0C     } BUFFER INDEX TO FIRST ENTRY
AD5E-  8C 9C B3   STY  $B39C    }
AD61-  B1 42      LDA  ($42),Y    GET TRACK NO. OF A DATA SECTOR
AD63-  30 0B      BMI  $AD70    } NONE, SKIP IT
AD65-  F0 09      BEQ  $AD70    }
AD67-  48         PHA           }
AD68-  C8         INY           }
AD69-  B1 42      LDA  ($42),Y  } GET SECTOR NO. TOO
AD6B-  A8         TAY           }
AD6C-  68         PLA           }
AD6D-  20 89 AD   JSR  $AD89      FREE THE DATA SECTOR
AD70-  AC 9C B3   LDY  $B39C    }
AD73-  C8         INY           } NEXT T/S LIST ENTRY
AD74-  C8         INY           }
AD75-  D0 E7      BNE  $AD5E      GO ON IF MORE IN THIS SECTOR
AD77-  AD D3 B5   LDA  $B5D3    } T/S OF THIS T/S LIST SECTOR
AD7A-  AC D4 B5   LDY  $B5D4    }
AD7D-  20 89 AD   JSR  $AD89      FREE IT
AD80-  38         SEC           }
AD81-  B0 D1      BCS  $AD54    } AND GO GET NEXT ONE IF ANY
AD83-  20 FB AF   JSR  $AFFB
AD86-  4C 7F B3   JMP  $B37F      EXIT
-------------------------------------------------------------- 
AD89-  38         SEC
AD8A-  20 DD B2   JSR  $B2DD      DEALLOCATE SECTOR IN VTOC
AD8D-  A9 00      LDA  #$00     }
AD8F-  A2 03      LDX  #$03     } (DOS 3.3 #$05)
AD91-  9D F0 B5   STA  $B5F0,X  } ZERO SECTOR ALLOCATION
AD94-  CA         DEX           }       AREA
AD95-  10 FA      BPL  $AD91    }
```

CATALOG

```
AD97-   60          RTS                 EXIT TO CALLER
AD98-   20 DC AB    JSR   $ABDC         INITIALIZE FIOWA
AD9B-   A9 FF       LDA   #$FF          } ANY VOL # WILL DO
AD9D-   8D F9 B5    STA   $B5F9         }
ADA0-   20 F7 AF    JSR   $AFF7         READ VTOC
ADA3-   A9 16       LDA   #$16          } COUNT 22 LINES BEFORE WAITING
ADA5-   8D 9D B3    STA   $B39D         }
ADA8-   20 2F AE    JSR   $AE2F         } SKIP 2 LINES
ADAB-   20 2F AE    JSR   $AE2F         }
ADAE-   A2 0B       LDX   #$0B          }
ADB0-   BD AF B3    LDA   $B3AF,X       }
ADB3-   20 ED FD    JSR   $FDED         } PRINT "DISK VOLUME "
ADB6-   CA          DEX                 }
ADB7-   10 F7       BPL   $ADB0         }
ADB9-   86 45       STX   $45           }
ADBB-   AD F6 B7    LDA   $B7F6         } CONVERT AND PRINT VOL #
ADBE-   85 44       STA   $44           }
ADC0-   20 42 AE    JSR   $AE42         }
ADC3-   20 2F AE    JSR   $AE2F         } SKIP 2 LINES
ADC6-   20 2F AE    JSR   $AE2F         }
ADC9-   18          CLC                 } READ FIRST DIRECTORY SECTOR
ADCA-   20 11 B0    JSR   $B011         }
ADCD-   B0 5D       BCS   $AE2C         NO MORE, EXIT
ADCF-   A2 00       LDX   #$00          } SET INDEX
ADD1-   8E 9C B3    STX   $B39C         }
ADD4-   BD C6 B4    LDA   $B4C6,X       GET TRACK
ADD7-   F0 53       BEQ   $AE2C         IF Ø, DONE
ADD9-   30 4A       BMI   $AE25         IF FF, DELETED ENTRY
ADDB-   A0 A0       LDY   #$A0          ASSUME UNLOCKED
ADDD-   BD C8 B4    LDA   $B4C8,X       GET FILE TYPE
ADE0-   10 02       BPL   $ADE4         OK
ADE2-   A0 AA       LDY   #$AA          LOCKED, USE A "*"
ADE4-   98          TYA                 } PRINT LOCK/UNLOCK FLAG
ADE5-   20 ED FD    JSR   $FDED         }
ADE8-   BD C8 B4    LDA   $B4C8,X       GET FILE TYPE AGAIN
ADEB-   29 7F       AND   #$7F          }
ADED-   A0 07       LDY   #$07          }
*ADEF-  0A          ASL                 } GET ALPHABETIC REPRESENTATION
*ADF0-  0A          ASL                 } OF FILE TYPE FROM TABLE
ADF1-   B0 03       BCS   $ADF6         }
ADF3-   88          DEY                 }
ADF4-   D0 FA       BNE   $ADF0         }
ADF6-   B9 A7 B3    LDA   $B3A7,Y
ADF9-   20 ED FD    JSR   $FDED         PRINT IT
ADFC-   A9 A0       LDA   #$A0          } A BLANK
ADFE-   20 ED FD    JSR   $FDED         }
AE01-   BD E7 B4    LDA   $B4E7,X       }
AE04-   85 44       STA   $44           } CONVERT AND PRINT
AE06-   BD E8 B4    LDA   $B4E8,X       } NUMBER OF SECTORS
AE09-   85 45       STA   $45           }
AE0B-   20 42 AE    JSR   $AE42         }
AE0E-   A9 A0       LDA   #$A0          } A BLANK
AE10-   20 ED FD    JSR   $FDED         }
AE13-   E8          INX                 }
AE14-   E8          INX                 } SKIP TO FILE NAME
AE15-   E8          INX                 }
AE16-   A0 1D       LDY   #$1D          }
AE18-   BD C6 B4    LDA   $B4C6,X       }
AE1B-   20 ED FD    JSR   $FDED         } PRINT IT
AE1E-   E8          INX                 }
AE1F-   88          DEY                 }
AE20-   10 F6       BPL   $AE18         }
AE22-   20 2F AE    JSR   $AE2F         NEW LINE
```

HEADER

```
AE25-  20 30 B2     JSR   $B230   ADVANCE TO NEXT DIRECTORY ENTRY
AE28-  90 A7        BCC   $ADD1   DO NEXT
AE2A-  B0 9E        BCS   $ADCA   NO MORE THIS SECTOR, READ NEXT
AE2C-  4C 7F B3     JMP   $B37F   EXIT WHEN FINISHED
```

SKIP A LINE

```
AE2F-  A9 8D        LDA   #$8D    } OUTPUT A (CR)
AE31-  20 ED FD     JSR   $FDED   }
AE34-  CE 9D B3     DEC   $B39D   DECREMENT LINE COUNTER
AE37-  D0 08        BNE   $AE41   OK
AE39-  20 0C FD     JSR   $FD0C   ELSE, WAIT FOR KEYBOARD (TO DELAY)
AE3C-  A9 15        LDA   #$15    } THEN COUNT 21 LINES
AE3E-  8D 9D B3     STA   $B39D   }
AE41-  60           RTS
```

CONVERT $44 VALUE TO 3 DIGIT DEC NUMBER & PRINT IT

```
AE42-  A0 02        LDY   #$02    THREE DIGITS
AE44-  A9 00        LDA   #$00    } INIT ACCUMULATOR
AE46-  48           PHA           }
AE47-  A5 44        LDA   $44
AE49-  D9 A4 B3     CMP   $B3A4,Y 100'S, 10'S, OR UNITS
AE4C-  90 12        BCC   $AE60   DIGIT REQUIRED?
AE4E-  F9 A4 B3     SBC   $B3A4,Y }
AE51-  85 44        STA   $44     }
AE53-  A5 45        LDA   $45     } YES, SUBTRACT 100, 10, 1
AE55-  E9 00        SBC   #$00    }
AE57-  85 45        STA   $45     }
AE59-  68           PLA           }
AE5A-  69 00        ADC   #$00    } INCREMENT ACCUMULATOR
AE5C-  48           PHA           }
AE5D-  4C 47 AE     JMP   $AE47   TRY AGAIN
AE60-  68           PLA           }
AE61-  09 B0        ORA   #$B0    } CONVERT ACCUMULATOR
AE63-  20 ED FD     JSR   $FDED   PRINT DIGIT
AE66-  88           DEY           }
AE67-  10 DB        BPL   $AE44   } NEXT DIGIT
AE69-  60           RTS
```

RESTORE FIOWA

```
AE6A-  20 08 AF     JSR   $AF08   PT TO BUFFER #1
AE6D-  A0 00        LDY   #$00    } START RETURN CODE AT 0
AE6F-  8C C5 B5     STY   $B5C5   }
AE72-  B1 42        LDA   ($42),Y }
AE74-  99 D1 B5     STA   $B5D1,Y } COPY 45 BYTE SAVED IMAGE
AE77-  C8           INY           } OF FIOWORKAREA FROM BUFFER
AE78-  C0 2D        CPY   #$2D    }
AE7A-  D0 F6        BNE   $AE72   }
AE7C-  18           CLC
AE7D-  60           RTS
```

SAVE FIOWA

```
AE7E-  20 08 AF     JSR   $AF08   SELECT FIOWA BUFFER
AE81-  A0 00        LDY   #$00
AE83-  B9 D1 B5     LDA   $B5D1,Y }
AE86-  91 42        STA   ($42),Y } SAVE 45 BYTE FIOWA
AE88-  C8           INY           } INTO BUFFER
AE89-  C0 2D        CPY   #$2D    }
AE8B-  D0 F6        BNE   $AE83   }
AE8D-  60           RTS
```

INIT

```
AE8E-  20 DC AB     JSR   $ABDC   INITIALIZE FIOWA
AE91-  A9 04        LDA   #$04    } FORMAT DISKETTE W/RWTS
AE93-  20 58 B0     JSR   $B058   }
AE96-  AD F9 B5     LDA   $B5F9   }
AE99-  49 FF        EOR   #$FF    } PUT VOL # INTO VTOC
AE9B-  8D C1 B3     STA   $B3C1   }
AE9E-  A9 11        LDA   #$11    } AND TRACK TO ALLOCATE NEXT
AEA0-  8D EB B3     STA   $B3EB   }
AEA3-  A9 01        LDA   #$01    } DIRECTION OF ALLOCATION (FORWARD)
AEA5-  8D EC B3     STA   $B3EC   }
AEA8-  A2 38        LDX   #$38    OFFSET TO VOLUME BIT MAP
AEAA-  A9 00        LDA   #$00
```

```
AEAC-  9D BB B3    STA  $B3BB,X   } ZERO VOLUME SPACE (ALL IN USE)
AEAF-  E8          INX            }
AEB0-  D0 FA       BNE  $AEAC     }
AEB2-  A2 0C       LDX  #$0C      SKIP 1ST 3 TRACKS (DOS BOOT SPACE)
AEB4-  E0 8C       CPX  #$8C      } END OF MAP?
AEB6-  F0 14       BEQ  $AECC     }
AEB8-  A0 03       LDY  #$03      }
AEBA-  B9 A0 B3    LDA  $B3A0,Y   } COPY 4 BYTE BIT MASK TO ENTRY
AEBD-  9D F3 B3    STA  $B3F3,X   } TO FREE ALL SECTORS IN TRACK
AEC0-  E8          INX            }
AEC1-  88          DEY            }
AEC2-  10 F6       BPL  $AEBA     }
AEC4-  E0 44       CPX  #$44      }
AEC6-  D0 EC       BNE  $AEB4     } SKIP ALSO DIRECTORY TRACK (17)
AEC8-  A2 48       LDX  #$48      }
AECA-  D0 E8       BNE  $AEB4     }
AECC-  20 FB AF    JSR  $AFFB
AECF-  A2 00       LDX  #$00      }
AED1-  8A          TXA            }
AED2-  9D BB B4    STA  $B4BB,X   } ZERO DIRECTORY SECTOR BUFFER
AED5-  E8          INX            }
AED6-  D0 FA       BNE  $AED2     }
AED8-  20 45 B0    JSR  $B045     POINT RWTS TO DIRECTORY BUFFER
AEDB-  A9 11       LDA  #$11      TRACK 17
AEDD-  AC F0 B3    LDY  $B3F0     } LAST SECTOR ON TRACK
AEE0-  88          DEY            }
AEE1-  88          DEY
AEE2-  8D EC B7    STA  $B7EC     PASS TRACK NO. TO RWTS
AEE5-  8D BC B4    STA  $B4BC     } POINT THIS DIR. SECTOR TO NEXT (S-1)
AEE8-  8C BD B4    STY  $B4BD     }
AEEB-  C8          INY            } RWTS SECTOR NO. FOR THIS DIR. SECT.
AEEC-  8C ED B7    STY  $B7ED     }
AEEF-  A9 02       LDA  #$02      } GO TO RWTS TO WRITE SECTOR
AEF1-  20 58 B0    JSR  $B058     }
AEF4-  AC BD B4    LDY  $B4BD     GET NEXT SECTOR
AEF7-  88          DEY            AND NEXT
AEF8-  30 05       BMI  $AEFF     } INITIALIZE ALL BUT SECTOR 0
AEFA-  D0 EC       BNE  $AEE8     }
AEFC-  98          TYA            } ON LAST ONE, ZERO TRACK PTR
AEFD-  F0 E6       BEQ  $AEE5     }
AEFF-  20 C2 B7    JSR  $B7C2     POINT RWTS PARMS AT DOS LOAD POINT
AF02-  20 4A B7    JSR  $B74A     WRITE DOS IMAGE ON TRKS 0-2
AF05-  4C 7F B3    JMP  $B37F     EXIT

AF08-  A2 00       LDX  #$00      } SELECT BUFFER #1 (FIOWA)
AF0A-  F0 06       BEQ  $AF12     }
AF0C-  A2 02       LDX  #$02      } SELECT BUFFER #2 (T/S LIST)
AF0E-  D0 02       BNE  $AF12     }
AF10-  A2 04       LDX  #$04      SELECT BUFFER #3 (DATA)

AF12-  BD C7 B5    LDA  $B5C7,X   }
AF15-  85 42       STA  $42       } SET $42,$43 FROM FIO PARMLIST
AF17-  BD C8 B5    LDA  $B5C8,X   }
AF1A-  85 43       STA  $43       }
AF1C-  60          RTS

AF1D-  2C D5 B5    BIT  $B5D5     } DATA BUFFER CHANGED?
AF20-  70 01       BVS  $AF23     }
AF22-  60          RTS            NO, EXIT
AF23-  20 E4 AF    JSR  $AFE4     SET UP RWTS PTR
AF26-  A9 02       LDA  #$02      } GO WRITE USING RWTS
AF28-  20 52 B0    JSR  $B052     }
AF2B-  A9 BF       LDA  #$BF      }
AF2D-  2D D5 B5    AND  $B5D5     } DATA BUFFER NO LONGER NEEDS CHECKPOIN
AF30-  8D D5 B5    STA  $B5D5     }
AF33-  60          RTS
```

POINT TO A BUFFER

CHECKPOINT DATA SECTOR BUFFER (#3

```
AF34-  AD D5 B5    LDA   $B5D5   } T/S LIST CHANGED?
AF37-  30 01       BMI   $AF3A   }
AF39-  60          RTS           NO
AF3A-  20 4B AF    JSR   $AF4B   SET UP RWTS PTR
AF3D-  A9 02       LDA   #$02    }
AF3F-  20 52 B0    JSR   $B052   } WRITE SECTOR
AF42-  A9 7F       LDA   #$7F    }
AF44-  2D D5 B5    AND   $B5D5   } T/S LIST NO LONGER NEEDS CHECKPOINTING
AF47-  8D D5 B5    STA   $B5D5   }
AF4A-  60          RTS
```

CHECKPOINT TRACK/SECTOR LIST BUFFER (#2)

```
AF4B-  AD C9 B5    LDA   $B5C9   }
AF4E-  8D F0 B7    STA   $B7F0   } COPY ADDRESS OF T/S LIST
AF51-  AD CA B5    LDA   $B5CA   } BUFF TO RWTS PARMS
AF54-  8D F1 B7    STA   $B7F1   }
AF57-  AE D3 B5    LDX   $B5D3   }
AF5A-  AC D4 B5    LDY   $B5D4   } GET T/S FOR IT
AF5D-  60          RTS
```

PREPARE FOR RWTS WITH T/S LIST

```
AF5E-  08          PHP           MEMORIZE ENTRY CODE
AF5F-  20 34 AF    JSR   $AF34   CHECKPOINT CURR. T/S LST
AF62-  20 4B AF    JSR   $AF4B   SET UP FOR RWTS
AF65-  20 0C AF    JSR   $AF0C   SELECT T/S LIST BUFF.
AF68-  28          PLP           } FIRST OR NEXT?
AF69-  B0 09       BCS   $AF74   }
AF6B-  AE D1 B5    LDX   $B5D1   } FIRST, WHERE IS IT?
AF6E-  AC D2 B5    LDY   $B5D2   }
AF71-  4C B5 AF    JMP   $AFB5
AF74-  A0 01       LDY   #$01    NEXT, GET TRK
AF76-  B1 42       LDA   ($42),Y } ARE THERE ANY MORE AVAILABLE?
AF78-  F0 08       BEQ   $AF82   }
AF7A-  AA          TAX           }
AF7B-  C8          INY           }
AF7C-  B1 42       LDA   ($42),Y } YES, GET SECTOR OF NEXT
AF7E-  A8          TAY           }
AF7F-  4C B5 AF    JMP   $AFB5   AND GO!
AF82-  AD BB B5    LDA   $B5BB   } NO MORE T/S LISTS,
AF85-  C9 04       CMP   #$04    } ARE WE WRITING TO FILE?
AF87-  F0 02       BEQ   $AF8B   }
AF89-  38          SEC           } NO, EXIT WITH END-OF-FILE ERROR
AF8A-  60          RTS           }
AF8B-  20 44 B2    JSR   $B244   YES, ALLOCATE A NEW SECTOR
AF8E-  A0 02       LDY   #$02    }
AF90-  91 42       STA   ($42),Y }
AF92-  48          PHA           } POINT OLD T/S LIST TO NEW
AF93-  88          DEY           }
AF94-  AD F1 B5    LDA   $B5F1   }
AF97-  91 42       STA   ($42),Y }
AF99-  48          PHA
AF9A-  20 3A AF    JSR   $AF3A   WRITE T/S LIST BUFFER
AF9D-  20 D6 B7    JSR   $B7D6   ZERO BUFFER
AFA0-  A0 05       LDY   #$05    }
AFA2-  AD DE B5    LDA   $B5DE   }
AFA5-  91 42       STA   ($42),Y } +5,+6 CONTAIN RELATIVE SECTOR #
AFA7-  C8          INY           } OF FIRST SECTOR IN THIS T/S LIST
AFA8-  AD DF B5    LDA   $B5DF   }
AFAB-  91 42       STA   ($42),Y }
AFAD-  68          PLA           }
AFAE-  AA          TAX           } T/S OF THIS LIST
AFAF-  68          PLA           }
AFB0-  A8          TAY           }
AFB1-  A9 02       LDA   #$02    } WRITE IT
AFB3-  D0 02       BNE   $AFB7   }
AFB5-  A9 01       LDA   #$01    (READ IT IF OLD)
AFB7-  8E D3 B5    STX   $B5D3   SET TRACK
```

GET A T/S LIST SECTOR

C=0 : FIRST
C=1 : NEXT

```
AFBA-  8C D4 B5   STY  $B5D4   SET SECTOR
AFBD-  20 52 B0   JSR  $B052   CALL RWTS
AFC0-  A0 05      LDY  #$05
AFC2-  B1 42      LDA  ($42),Y
AFC4-  8D DC B5   STA  $B5DC
AFC7-  18         CLC
AFC8-  6D DA B5   ADC  $B5DA
AFCB-  8D DE B5   STA  $B5DE
AFCE-  C8         INY
AFCF-  B1 42      LDA  ($42),Y
AFD1-  8D DD B5   STA  $B5DD
AFD4-  6D DB B5   ADC  $B5DB
AFD7-  8D DF B5   STA  $B5DF
AFDA-  18         CLC
AFDB-  60         RTS
```

BUFF+5,+6 → REL. SECT. # FIRST SECT
+ NUMBER OF SECTORS PER LIST
= REL. SECT. # OF LAST+1 SECTOR IN LIST

EXIT AND SAY WE FOUND IT

READ A DATA SECT.

```
AFDC-  20 E4 AF   JSR  $AFE4   SET UP FOR RWTS
AFDF-  A9 01      LDA  #$01    READ OPCODE
AFE1-  4C 52 B0   JMP  $B052   GO DO IT
```

PREPARE FOR RWTS WITH DATA

```
AFE4-  AC CB B5   LDY  $B5CB   COPY ADDRESS OF DATA
AFE7-  AD CC B5   LDA  $B5CC   SECTOR BUFF TO RWTS PARMS
AFEA-  8C F0 B7   STY  $B7F0
AFED-  8D F1 B7   STA  $B7F1
AFF0-  AE D6 B5   LDX  $B5D6   GET T/S FOR IT
AFF3-  AC D7 B5   LDY  $B5D7
AFF6-  60         RTS
```

READ/WRITE VTOC

```
AFF7-  A9 01      LDA  #$01    READ
AFF9-  D0 02      BNE  $AFFD     OR
AFFB-  A9 02      LDA  #$02    WRITE
AFFD-  AC C3 AA   LDY  $AAC3   COPY VTOC SECTOR BUFFER
B000-  8C F0 B7   STY  $B7F0   ADDRESS TO RWTS PARMS
B003-  AC C4 AA   LDY  $AAC4
B006-  8C F1 B7   STY  $B7F1
B009-  AE FA B5   LDX  $B5FA   GET TRACK NO.
B00C-  A0 00      LDY  #$00    AND SECTOR
B00E-  4C 52 B0   JMP  $B052   AND GO
```

READ A DIRECTORY SECTOR

C=0 FIRST
C=1 NEXT

```
B011-  08         PHP          MEMORIZE ENTRY CODE
B012-  20 45 B0   JSR  $B045   SET BUFFER POINTERS
B015-  28         PLP          FIRST OR NEXT?
B016-  B0 08      BCS  $B020
B018-  AC BD B3   LDY  $B3BD   FIRST, GET T/S FROM VTOC+1
B01B-  AE BC B3   LDX  $B3BC
B01E-  D0 0A      BNE  $B02A
B020-  AE BC B4   LDX  $B4BC   NEXT, GET TRACK FROM
B023-  D0 02      BNE  $B027   DIRECTORY. IF 0...
B025-  38         SEC          WE ARE AT END OF DIRECTORY
B026-  60         RTS
B027-  AC BD B4   LDY  $B4BD   GET SECTOR IF NEXT
B02A-  8E 97 B3   STX  $B397   SAVE T/S OF THIS SECTOR
B02D-  8C 98 B3   STY  $B398
B030-  A9 01      LDA  #$01    READ IT
B032-  20 52 B0   JSR  $B052
B035-  18         CLC          AND EXIT
B036-  60         RTS
```

WRITE DIRECTORY SECTOR

```
B037-  20 45 B0   JSR  $B045   SET BUFFER PTRS
B03A-  AE 97 B3   LDX  $B397   FIND ITS T/S
B03D-  AC 98 B3   LDY  $B398
B040-  A9 02      LDA  #$02    GO WRITE IT AND EXIT
B042-  4C 52 B0   JMP  $B052
```

PREPARE FOR RWTS FOR DIRECTORY

```
B045-  AD C5 AA   LDA  $AAC5   COPY DIRECTORY BUFFER
B048-  8D F0 B7   STA  $B7F0   ADDRESS TO RWTS PARMS
B04B-  AD C6 AA   LDA  $AAC6
B04E-  8D F1 B7   STA  $B7F1
B051-  60         RTS
```

RWTS DRIVER

```
B052-  8E EC B7    STX   $B7EC   } SET TRACK/SECTOR
B055-  8C ED B7    STY   $B7ED   }
B058-  8D F4 B7    STA   $B7F4     AND COMMAND CODE
B05B-  C9 02       CMP   #$02      WRITE?
B05D-  D0 06       BNE   $B065     NO
B05F-  0D D5 B5    ORA   $B5D5   } SET FLAG
B062-  8D D5 B5    STA   $B5D5   }
B065-  AD F9 B5    LDA   $B5F9   }
B068-  49 FF       EOR   #$FF    } SET VOL # EXPECTED
B06A-  8D EB B7    STA   $B7EB   }
B06D-  AD F7 B5    LDA   $B5F7   } SLOT*16
B070-  8D E9 B7    STA   $B7E9   }
B073-  AD F8 B5    LDA   $B5F8   } DRIVE
B076-  8D EA B7    STA   $B7EA   }
B079-  AD E2 B5    LDA   $B5E2   }
B07C-  8D F2 B7    STA   $B7F2   } SECTOR SIZE
B07F-  AD E3 B5    LDA   $B5E3   }
B082-  8D F3 B7    STA   $B7F3   }
B085-  A9 01       LDA   #$01    } IOB TYPE
B087-  8D E8 B7    STA   $B7E8   }
B08A-  AC C1 AA    LDY   $AAC1   } PASS ↑ TO RWTS PARMS
B08D-  AD C2 AA    LDA   $AAC2   }
B090-  20 B5 B7    JSR   $B7B5     GO TO RWTS
B093-  AD F6 B7    LDA   $B7F6   } RETURN TRUE VOL# TO FIO PARMS
B096-  8D BF B5    STA   $B5BF   }
B099-  A9 FF       LDA   #$FF    } WATCH FOR CHANGES
B09B-  8D EB B7    STA   $B7EB   }
B09E-  B0 01       BCS   $B0A1
B0A0-  60          RTS             NO ERROR, EXIT NOW
B0A1-  AD F5 B7    LDA   $B7F5     ERROR, GET RETURN CODE
B0A4-  A0 07       LDY   #$07    }
B0A6-  C9 20       CMP   #$20    } IF VOL MISMATCH, RC=7
B0A8-  F0 08       BEQ   $B0B2   }
B0AA-  A0 04       LDY   #$04    }
B0AC-  C9 10       CMP   #$10    } IF WRITE PROTECTED, RC=4
B0AE-  F0 02       BEQ   $B0B2   }
B0B0-  A0 08       LDY   #$08      ALL OTHERS ARE RC=8 "I/O ERROR"
B0B2-  98          TYA
B0B3-  4C 85 B3    JMP   $B385     CLEAR OUT OF FIO NOW!
```

READ NEXT DATA SECTOR

```
B0B6-  AD E4 B5    LDA   $B5E4   } CURRENT POSITION IN
B0B9-  CD E0 B5    CMP   $B5E0   } CURRENT SECTOR?
B0BC-  D0 08       BNE   $B0C6   }
B0BE-  AD E5 B5    LDA   $B5E5   }
B0C1-  CD E1 B5    CMP   $B5E1   }
B0C4-  F0 66       BEQ   $B12C   }
B0C6-  20 1D AF    JSR   $AF1D     NO, CHECKPOINT DATA BUFFER
B0C9-  AD E5 B5    LDA   $B5E5   }
B0CC-  CD DD B5    CMP   $B5DD   }
B0CF-  90 1C       BCC   $B0ED   } CURRENT POSITION PRIOR TO THIS
B0D1-  D0 08       BNE   $B0DB   } T/S LIST'S DOMAIN?
B0D3-  AD E4 B5    LDA   $B5E4   }
B0D6-  CD DC B5    CMP   $B5DC   }
B0D9-  90 12       BCC   $B0ED   }
B0DB-  AD E5 B5    LDA   $B5E5   }
B0DE-  CD DF B5    CMP   $B5DF   }   NO,
B0E1-  90 10       BCC   $B0F3   } CURRENT POSITION PAST THIS
B0E3-  D0 08       BNE   $B0ED   } T/S LIST'S DOMAIN?
B0E5-  AD E4 B5    LDA   $B5E4   }
B0E8-  CD DE B5    CMP   $B5DE   }
B0EB-  90 06       BCC   $B0F3   }
B0ED-  20 5E AF    JSR   $AF5E     GET {NEXT/FIRST} T/S LIST AND TRY AGAIN
B0F0-  90 D7       BCC   $B0C9
B0F2-  60          RTS             RAN OFF END OF FILE READING
```

```
B0F3-  38          SEC          DATA IS IN THIS T/S LIST
B0F4-  AD E4 B5    LDA  $B5E4   } COMPUTE DISPLACEMENT TO
B0F7-  ED DC B5    SBC  $B5DC   } PROPER ENTRY IN T/S LIST
B0FA-  0A          ASL          }
B0FB-  69 0C       ADC  #$0C    }
B0FD-  A8          TAY          }
B0FE-  20 0C AF    JSR  $AF0C   SELECT BUFFER
B101-  B1 42       LDA  ($42),Y GET TRACK
B103-  D0 0F       BNE  $B114   OK?
B105-  AD BB B5    LDA  $B5BB   } NO SECTOR HERE, WRITING?
B108-  C9 04       CMP  #$04    }
B10A-  F0 02       BEQ  $B10E   YES, GO MAKE ONE
B10C-  38          SEC          } NO READ INTO EMPTY AREA
B10D-  60          RTS          }
B10E-  20 34 B1    JSR  $B134   ADD NEW SECTOR
B111-  4C 20 B1    JMP  $B120   AND GO ON
B114-  8D D6 B5    STA  $B5D6   OLD SECTOR, SET ITS TRACK
B117-  C8          INY          }
B118-  B1 42       LDA  ($42),Y } AND SECTOR #
B11A-  8D D7 B5    STA  $B5D7   }
B11D-  20 DC AF    JSR  $AFDC   READ IT IN
B120-  AD E4 B5    LDA  $B5E4   }
B123-  8D E0 B5    STA  $B5E0   } SET SECTOR LAST READ #
B126-  AD E5 B5    LDA  $B5E5   }
B129-  8D E1 B5    STA  $B5E1   }
B12C-  20 10 AF    JSR  $AF10   SELECT DATA BUFFER
B12F-  AC E6 B5    LDY  $B5E6   GET BYTE OFFSET
B132-  18          CLC          } EXIT NORMALLY
B133-  60          RTS          }
```

ADD A NEW DATA SECTOR

```
B134-  8C 9D B3    STY  $B39D   SAVE YREG
B137-  20 44 B2    JSR  $B244   GO ALLOCATE SECTOR
B13A-  AC 9D B3    LDY  $B39D   RESTORE YREG
B13D-  C8          INY          }
B13E-  91 42       STA  ($42),Y } PUT SECTOR # IN LIST
B140-  8D D7 B5    STA  $B5D7   }
B143-  88          DEY          }
B144-  AD F1 B5    LDA  $B5F1   } AND TRACK #
B147-  91 42       STA  ($42),Y }
B149-  8D D6 B5    STA  $B5D6
B14C-  20 10 AF    JSR  $AF10   SELECT DATA BUFFER
B14F-  20 D6 B7    JSR  $B7D6   ZERO IT
B152-  A9 C0       LDA  #$C0    }
B154-  0D D5 B5    ORA  $B5D5   } T/S LIST & DATA SECTORS NEED CHECKPOINT
B157-  8D D5 B5    STA  $B5D5   }
B15A-  60          RTS
```

INCREMENT RECORD # & BYTE #

```
B15B-  AE EA B5    LDX  $B5EA   }
B15E-  8E BD B5    STX  $B5BD   } RETURN RECORD #
B161-  AE EB B5    LDX  $B5EB   } TO FIO CALLER
B164-  8E BE B5    STX  $B5BE   }
B167-  AE EC B5    LDX  $B5EC   } PASS BYTE OFFSET
B16A-  AC ED B5    LDY  $B5ED   }    ALSO
B16D-  8E BF B5    STX  $B5BF   }
B170-  8C C0 B5    STY  $B5C0   }
B173-  E8          INX          }
B174-  D0 01       BNE  $B177   } INC BYTE #
B176-  C8          INY          }
B177-  CC E9 B5    CPY  $B5E9   }
B17A-  D0 11       BNE  $B18D   } AT RECORD LENGTH?
B17C-  EC E8 B5    CPX  $B5E8   }
B17F-  D0 0C       BNE  $B18D   }
B181-  A2 00       LDX  #$00    } YES, BYTE # Ø
B183-  A0 00       LDY  #$00    }
B185-  EE EA B5    INC  $B5EA
```

```
B188- D0 03     BNE  $B18D  } NEXT RECORD #
B18A- EE EB B5  INC  $B5EB  }
B18D- 8E EC B5  STX  $B5EC  } AND BYTE #
B190- 8C ED B5  STY  $B5ED  }
B193- 60        RTS
```

INCREMENT FILE OFFSET

```
B194- EE E6 B5  INC  $B5E6  BUMP SECTOR BYTE OFFSET
B197- D0 08     BNE  $B1A1  IF AT END...
B199- EE E4 B5  INC  $B5E4  }
B19C- D0 03     BNE  $B1A1  } NEXT SECTOR #
B19E- EE E5 B5  INC  $B5E5  }
B1A1- 60        RTS
```

COPY AND ADVANCE RANGE ADDRESS

```
B1A2- AC C3 B5  LDY  $B5C3  }
B1A5- AE C4 B5  LDX  $B5C4  } COPY ADDRESS TO $42
B1A8- 84 42     STY  $42    }
B1AA- 86 43     STX  $43    }
B1AC- EE C3 B5  INC  $B5C3  }
B1AF- D0 03     BNE  $B1B4  } ADVANCE FOR NEXT TIME
B1B1- EE C4 B5  INC  $B5C4  }
B1B4- 60        RTS
```

DECREMENT RANGE LENGTH

```
B1B5- AC C1 B5  LDY  $B5C1  }
B1B8- D0 08     BNE  $B1C2  }
B1BA- AE C2 B5  LDX  $B5C2  } DECREMENT LENGTH
B1BD- F0 07     BEQ  $B1C6  } IN FIO PARM LIST
B1BF- CE C2 B5  DEC  $B5C2  } BY ONE
B1C2- CE C1 B5  DEC  $B5C1  }
B1C5- 60        RTS
B1C6- 4C 7F B3  JMP  $B37F  IF ZERO, EXIT FIO
```

LOCATE OR ALLOCATE A DIRECTORY ENTRY

```
B1C9- 20 F7 AF  JSR  $AFF7  READ VTOC
B1CC- AD C3 B5  LDA  $B5C3  }
B1CF- 85 42     STA  $42    } SET UP POINTER TO
B1D1- AD C4 B5  LDA  $B5C4  } FILENAME PASSED
B1D4- 85 43     STA  $43    }
B1D6- A9 01     LDA  #$01   } 1ST PASS, LOCATE FILE
B1D8- 8D 9D B3  STA  $B39D  }
B1DB- A9 00     LDA  #$00   } START DIRECTORY SECTOR
B1DD- 8D D8 B5  STA  $B5D8  } OFFSET
B1E0- 18        CLC         GET FIRST DIRECTORY SECTOR
B1E1- EE D8 B5  INC  $B5D8  BUMP SECTOR OFFSET
B1E4- 20 11 B0  JSR  $B011  GET DIRECTORY SECTOR
B1E7- B0 51     BCS  $B23A  END OF DIRECTORY? NEW PASS
B1E9- A2 00     LDX  #$00   } START ENTRY INDEX
B1EB- 8E 9C B3  STX  $B39C  }
B1EE- BD C6 B4  LDA  $B4C6,X GET TRACK
B1F1- F0 1F     BEQ  $B212  EMPTY ENTRY/END OF DIRECTORY?
B1F3- 30 22     BMI  $B217  DELETED ENTRY?
B1F5- A0 00     LDY  #$00
B1F7- E8        INX         }
B1F8- E8        INX         } BUMP TO FILENAME
B1F9- E8        INX         }
B1FA- B1 42     LDA  ($42),Y }
B1FC- DD C6 B4  CMP  $B4C6,X } IS THIS THE NAME
B1FF- D0 0A     BNE  $B20B   } WE ARE LOOKING FOR?
B201- C8        INY          }
B202- C0 1E     CPY  #$1E    }
B204- D0 F3     BNE  $B1F9   }
B206- AE 9C B3  LDX  $B39C  }
B209- 18        CLC         } YES, RETURN INDEX AND EXIT
B20A- 60        RTS         }
B20B- 20 30 B2  JSR  $B230  NO, NEXT ENTRY
B20E- 90 DB     BCC  $B1EB  CHECK IT OUT
B210- B0 CF     BCS  $B1E1  END OF SECTOR, GO GET NEXT
B212- AC 9D B3  LDY  $B39D  } 1ST PASS? YES, GO TO SECOND
B215- D0 C1     BNE  $B1D8  }
```

```
B217-  AC 9D B3  →LDY  $B39D   } 1ST PASS? YES, SKIP ENTRY
B21A-  D0 EF      BNE  $B20B   }
                                ↓2ND PASS, ALLOCATE ENTRY
B21C-  A0 00      LDY  #$00    }
B21E-  E8         INX          } BUMP PAST T/S & TYPE
B21F-  E8         INX          }
B220-  E8        →INX          }
B221-  B1 42      LDA  ($42),Y }
B223-  9D C6 B4   STA  $B4C6,X } COPY NAME TO DIRECTORY
B226-  C8         INY          }
B227-  C0 1E      CPY  #$1E    }
B229-  D0 F5      BNE  $B220   }
B22B-  AE 9C B3   LDX  $B39C     RESTORE DIRECTORY INDEX
B22E-  38         SEC
B22F-  60         RTS

B230-  18         CLC          } ADD 35 (LENGTH OF ENTRY)
B231-  AD 9C B3   LDA  $B39C   } TO...
B234-  69 23      ADC  #$23    } INDEX
B236-  AA         TAX          } AT END OF SECTOR?
B237-  E0 F5      CPX  #$F5    }
B239-  60         RTS

B23A-  A9 00      LDA  #$00
B23C-  AC 9D B3   LDY  $B39D   } ON PASS 1? THEN GO DO 2
B23F-  D0 97      BNE  $B1D8   }
B241-  4C 77 B3   JMP  $B377     DONE BOTH PASSES, NO SPACE

B244-  AD F1 B5   LDA  $B5F1   } WORKING ON A TRACK NOW?
B247-  F0 21      BEQ  $B26A   }
B249-  CE F0 B5  →DEC  $B5F0     YES, WHAT IS NEXT SECT. #
B24C-  30 17      BMI  $B265     TRACK USED UP?
B24E-  18         CLC
B24F-  A2 04      LDX  #$04    }
B251-  3E F1 B5   ROL  $B5F1,X } ROTATE TRACK MASK
B254-  CA         DEX          } LEFT BY ONE
B255-  D0 FA      BNE  $B251   }
B257-  90 F0      BCC  $B249     THIS TRACK IN USE?
B259-  EE EE B5   INC  $B5EE   } NO, FILE HAS ONE MORE SECTOR NOW
B25C-  D0 03      BNE  $B261   }
B25E-  EE EF B5   INC  $B5EF   }
B261-  AD F0 B5   LDA  $B5F0     PASS BACK SECTOR # (TRACK IS @ B5F1)
B264-  60         RTS

B265-  A9 00     →LDA  #$00    } NO TRACK BEING USED
B267-  8D F1 B5   STA  $B5F1   }
B26A-  A9 00     →LDA  #$00    } ALLOW ONE CYCLE AT LEAST
B26C-  8D 9E B3   STA  $B39E   }
B26F-  20 F7 AF   JSR  $AFF7     READ VTOC
B272-  18         CLC
B273-  AD EB B3   LDA  $B3EB     GET LAST TRK TO ALLOCATED FROM
B276-  6D EC B3   ADC  $B3EC     GO PROPER DIRECTION (-1 or +1)
B279-  F0 09      BEQ  $B284     BACK TO TRK Ø?
B27B-  CD EF B3   CMP  $B3EF   } OUT PAST TRK 34?
B27E-  90 14      BCC  $B294   }
B280-  A9 FF      LDA  #$FF      YES, REVERSE ALLOCATION DIRECTION
B282-  D0 0A      BNE  $B28E
B284-  AD 9E B3  →LDA  $B39E   } 2ND TIME AT TRK Ø?
B287-  D0 37      BNE  $B2C0   } YES, OUT OF SPACE
B289-  A9 01      LDA  #$01    } NO, BUT REMEMBER WE WERE HERE
B28B-  8D 9E B3   STA  $B39E   }
B28E-  8D EC B3   STA  $B3EC     NEW DIRECTION (+1 or -1)
B291-  18         CLC          }
B292-  69 11      ADC  #$11    } BEGIN AT DIRECTORY TRACK (17 ± 1)
B294-  8D EB B3   STA  $B3EB   }
B297-  8D F1 B5   STA  $B5F1   }
B29A-  A8         TAY          )
B29B-  0A         ASL          )
```

COPY FILE NAME TO DIRECTORY

ADVANCE TO NEXT DIRECTORY ENTRY

SWITCH TO 2ND PASS IN DIRECTORY SCA

ALLOCATE A DISK SECTOR

FIND A TRACK WITH FREE SECTORS

```
B29C-  0A        ASL                  } COMPUTE BIT MAP INDEX (TRK*4)
B29D-  A8        TAY
B29E-  A2 04     LDX   #$04           4 BYTES TO CHECK
B2A0-  18        CLC                  ASSUME TRK FULL
B2A1-  B9 F6 B3 >LDA   $B3F6,Y      } COPY TRK MASK TO FIOWA
B2A4-  9D F1 B5  STA   $B5F1,X      }
B2A7-  F0 06     BEQ   $B2AF          8 SECTORS IN USE?
B2A9-  38        SEC                  TRK NOT FULL
B2AA-  A9 00     LDA   #$00          } PREALLOCATE ALL SECTORS ON TRK
B2AC-  99 F6 B3  STA   $B3F6,Y       }
B2AF-  88        DEY                  NEXT BYTE
B2B0-  CA        DEX
B2B1-  D0 EE     BNE   $B2A1
B2B3-  90 BD     BCC   $B272          NO FREE SECTORS FOUND THIS TRK? TRY NEXT
B2B5-  20 FB AF  JSR   $AFFB          FOUND SOME, WRITE VTOC
B2B8-  AD F0 B3  LDA   $B3F0         } START WITH LAST SECTOR IN TRK
B2BB-  8D F0 B5  STA   $B5F0         }
B2BE-  D0 89     BNE   $B249          GO GET A FREE SECTOR
B2C0-  4C 77 B3  JMP   $B377          NO SPACE, EXIT
```

RELEASE PRE-ALLOCATED TRK AND CHECKPOINT VTOC

```
B2C3-  AD F1 B5  LDA   $B5F1         } PREALLOCATED TRK?
B2C6-  D0 01     BNE   $B2C9         }
B2C8-  60        RTS                  NO
B2C9-  48       >PHA                  YES, SAVE IT
B2CA-  20 F7 AF  JSR   $AFF7          READ VTOC
B2CD-  AC F0 B5  LDY   $B5F0          SECTOR # (SHIFT COUNT)
B2D0-  68        PLA                  AND TRK #
B2D1-  18        CLC                  DON'T FREE ANYTHING
B2D2-  20 DD B2  JSR   $B2DD          GO UPDATE VTOC BIT MAP
B2D5-  A9 00     LDA   #$00          } NO TRACK PREALLOCATED NOW
B2D7-  8D F1 B5  STA   $B5F1         }
B2DA-  4C FB AF  JMP   $AFFB          EXIT BY WRITING VTOC
```

FREE A SECT. OR SHIFT MASK TO VTOC

C=0 JUST "OR" MASK

C=1 FREE SECTOR TO

```
B2DD-  A2 FC     LDX   #$FC           DO 4 BYTES FORWARD
B2DF-  7E F6 B4 >ROR   $B4F6,X       } ROTATE TRK MASK IN
B2E2-  E8        INX                 } FIOWA RIGHT, ADDING CARRY
B2E3-  D0 FA     BNE   $B2DF         }
B2E5-  C8        INY                  NEXT SECTOR
B2E6-  CC F0 B3  CPY   $B3F0          SHIFTED BACK TO END OF TRK?
B2E9-  D0 F2     BNE   $B2DD          NO, CONTINUE
B2EB-  0A        ASL                 } TRK * 4 INDEX TO MAP
B2EC-  0A        ASL                 }
B2ED-  A8        TAY
B2EE-  F0 0F     BEQ   $B2FF          DON'T FOOL WITH TRK Ø
B2F0-  A2 04     LDX   #$04
B2F2-  BD F1 B5 >LDA   $B5F1,X       } "OR" 4 BYTE MASK IN
B2F5-  19 F6 B3  ORA   $B3F6,Y       } FIOWA INTO MAP
B2F8-  99 F6 B3  STA   $B3F6,Y       }
B2FB-  88        DEY
B2FC-  CA        DEX
B2FD-  D0 F3     BNE   $B2F2
B2FF-  60        RTS
```

CALCULATE FILE POSITION

```
B300-  AD BD B5  LDA   $B5BD         }
B303-  8D E6 B5  STA   $B5E6         }
B306-  8D EA B5  STA   $B5EA         } SET RECORD # PASSED
B309-  AD BE B5  LDA   $B5BE         } IN FIOWA AND IN
B30C-  8D E4 B5  STA   $B5E4         } SECTOR OFFSETS
B30F-  8D EB B5  STA   $B5EB         }
B312-  A9 00     LDA   #$00          } CLEAR SECTOR OFFSET HIGH
B314-  8D E5 B5  STA   $B5E5         }
B317-  A0 10     LDY   #$10           16 BIT MULTIPLY
B319-  AA       >TAX
B31A-  AD E6 B5  LDA   $B5E6          BYTE OFFS
B31D-  4A        LSR
B31E-  B0 03     BCS   $B323
```

```
B320-  8A           TXA
B321-  90 0E        BCC   $B331
B323-  18           CLC
B324-  AD E5 B5     LDA   $B5E5     SECTOR OFFS
B327-  6D E8 B5     ADC   $B5E8     + RECD LEN
B32A-  8D E5 B5     STA   $B5E5
B32D-  8A           TXA
B32E-  6D E9 B5     ADC   $B5E9
B331-  6A           ROR             SHIFT
B332-  6E E5 B5     ROR   $B5E5     3 BYTE
B335-  6E E4 B5     ROR   $B5E4     POSITION
B338-  6E E6 B5     ROR   $B5E6
B33B-  88           DEY
B33C-  D0 DB        BNE   $B319
B33E-  AD BF B5     LDA   $B5BF     ADD BYTE # FROM
B341-  8D EC B5     STA   $B5EC     PARMS INTO
B344-  6D E6 B5     ADC   $B5E6     3 BYTE FILE
B347-  8D E6 B5     STA   $B5E6     POSITION
B34A-  AD C0 B5     LDA   $B5C0
B34D-  8D ED B5     STA   $B5ED
B350-  6D E4 B5     ADC   $B5E4
B353-  8D E4 B5     STA   $B5E4
B356-  A9 00        LDA   #$00
B358-  6D E5 B5     ADC   $B5E5
B35B-  8D E5 B5     STA   $B5E5
B35E-  60           RTS

B35F-  A9 01        LDA   #$01      "LANGUAGE NOT AVAILABLE"        ERROR
B361-  D0 22        BNE   $B385
B363-  A9 02        LDA   #$02      "RANGE ERROR" (BAD OPCODE)
B365-  D0 1E        BNE   $B385
B367-  A9 03        LDA   #$03      "RANGE ERROR" (BAD SUBCODE)
B369-  D0 1A        BNE   $B385
B36B-  A9 04        LDA   #$04      "WRITE PROTECTED"
B36D-  D0 16        BNE   $B385
B36F-  A9 05        LDA   #$05      "END OF DATA"
B371-  D0 12        BNE   $B385
B373-  A9 06        LDA   #$06      "FILE NOT FOUND"
B375-  D0 0E        BNE   $B385
*B377- 4C ED BF     JMP   $BFED     GO CLOSE ALL DOS FILES, RC=9
*B37A- EA           NOP             "DISK FULL"
B37B-  A9 0A        LDA   #$0A      "FILE LOCKED"
B37D-  D0 06        BNE   $B385

B37F-  AD C5 B5     LDA   $B5C5     GET FIO RETURN CODE=0           EXIT FIO
B382-  18           CLC             NO ERROR
B383-  90 01        BCC   $B386
B385-  38           SEC             ERROR
B386-  08           PHP             SAVE INDICATOR
B387-  8D C5 B5     STA   $B5C5     AND RC
*B38A- A9 00        LDA   #$00      CLEAR MONITOR STATUS REG (AFTER RWTS)
*B38C- 85 48        STA   $48
B38E-  20 7E AE     JSR   $AE7E     SAVE FIOWA
B391-  28           PLP             RESTORE INDICATOR
B392-  AE 9B B3     LDX   $B39B     AND STACK PTR
B395-  9A           TXS
B396-  60           RTS             EXIT FROM FIO

B397-  11 0C        ORA   ($0C),Y   B397/8: CURRENT DIRECTORY T/S   FIO SCRATCH SPACE
B399-  00           BRK
B39A-  00           BRK
B39B-  F5 00        SBC   $00,X     B39B: STACK REG SAVE    B39C: DIRECTORY IN
B39D-  01 00        ORA   ($00,X)   B39D: CATALOG LINE CTR.  B39E: LOCK/UNLOCK
B39F-  00           BRK                   DIRECTORY LOOKUP FLG        PARM
B3A0-  00           BRK                   ETC.                        ALLOC. FLG
B3A1-  00           BRK
```

COMPUTE RECORD # * RECORD LEN = FILE POSITION (3 BYTE OFFSET)

```
B3A2-  F8          SED
B3A3-  FF          ???
B3A4-  01 0A       ORA   ($0A,X)
B3A6-  64          ???
B3A7-  D4          ???
B3A8-  C9 C1       CMP   #$C1
B3AA-  C2          ???
*B3AB-  D3          ???
*B3AC-  D2          ???
*B3AD-  C1 C2       CMP   ($C2,X)
B3AF-  A0 C5       LDY   #$C5
B3B1-  CD D5 CC    CMP   $CCD5
B3B4-  CF          ???
B3B5-  D6 A0       DEC   $A0,X
B3B7-  CB          ???
B3B8-  D3          ???
B3B9-  C9 C4       CMP   #$C4
B3BB-  02          ???
B3BC-  11 0C       ORA   ($0C),Y
B3BE-  02          ???
B3BF-  00          BRK
B3C0-  00          BRK
B3C1-  FE 00 00    INC   $0000,X
B3C4-  00          BRK
B3C5-  00          BRK
B3C6-  00          BRK
B3C7-  00          BRK
B3C8-  00          BRK
B3C9-  00          BRK
B3CA-  00          BRK
B3CB-  00          BRK
B3CC-  00          BRK
B3CD-  00          BRK
B3CE-  00          BRK
B3CF-  00          BRK
B3D0-  00          BRK
B3D1-  00          BRK
B3D2-  00          BRK
B3D3-  00          BRK
B3D4-  00          BRK
B3D5-  00          BRK
B3D6-  00          BRK
B3D7-  00          BRK
B3D8-  00          BRK
B3D9-  00          BRK
B3DA-  00          BRK
B3DB-  00          BRK
B3DC-  00          BRK
B3DD-  00          BRK
B3DE-  00          BRK
B3DF-  00          BRK
B3E0-  00          BRK
B3E1-  00          BRK
B3E2-  7A          ???
B3E3-  00          BRK
B3E4-  00          BRK
B3E5-  00          BRK
B3E6-  00          BRK
B3E7-  00          BRK
B3E8-  00          BRK
B3E9-  00          BRK
B3EA-  00          BRK
B3EB-  18          CLC
```

B3A0 - B3A3: SECTOR MASK TO FREE ENTIRE TRACK (USED BY INIT)

1, 10, 100

DECIMAL CONVERT TABLE

T, I, A, B, S, R, A, B
00 01 02 04 08 10 20 40

FILE TYPE TABLE

FILE TYPES
(80 = LOCKED)

"DISK VOLUME:"
(BACKWARDS FOR PRINTING)

B3BC/D: ↑ 1ST DIRECTORY SECTOR

B3BE: DOS RELEASE #

B3C1: VOL #

VOLUME TABLE OF CONTENTS BUFFER

(ALL OTHERS NOT USED)

B3E2: NUMBER OF ENTRIES IN EACH T/S LIST SECTOR (122)

B3EB: TRACK TO ALLOCATE NEXT

```
B3EC-  01 00      ORA  ($00,X)
B3EE-  00         BRK
B3EF-  23         ???
B3F0-  0D 00 01   ORA  $0100
B3F3-  00         BRK
B3F4-  00         BRK
B3F5-  00         BRK
B3F6-  00         BRK
B3F7-  00         BRK
B3F8-  00         BRK
B3F9-  00         BRK
B3FA-  00         BRK
B3FB-  00         BRK
B3FC-  00         BRK
B3FD-  00         BRK
B3FE-  00         BRK
B3FF-  00         BRK
B400-  00         BRK
B401-  00         BRK
B402-  00         BRK
B403-  00         BRK
B404-  00         BRK
B405-  00         BRK
B406-  00         BRK
B407-  3F         ???
B408-  F8         SED
B409-  00         BRK
B40A-  00         BRK
B40B-  00         BRK
B40C-  00         BRK
B40D-  00         BRK
B40E-  00         BRK
B40F-  00         BRK
B410-  00         BRK
B411-  00         BRK
B412-  00         BRK
B413-  00         BRK
B414-  78         SEI
B415-  00         BRK
B416-  00         BRK
B417-  00         BRK
B418-  78         SEI
B419-  00         BRK
B41A-  00         BRK
B41B-  FF         ???
B41C-  F8         SED
B41D-  00         BRK
B41E-  00         BRK
B41F-  07         ???
B420-  F8         SED
B421-  00         BRK
B422-  00         BRK
B423-  00         BRK
B424-  00         BRK
B425-  00         BRK
B426-  00         BRK
B427-  1F         ???
B428-  F8         SED
B429-  00         BRK
B42A-  00         BRK
B42B-  00         BRK
B42C-  38         SEC
B42D-  00         BRK
```

B3EC: DIRECTION OF TRK ALLOC.
B3EF: NO. OF TRACKS ON A DISK
B3F0: NO. OF SECTORS ON A TRACK
B3F1/2: SECTOR SIZE

Ø TRK ↓

1

2

3

4

5

6

7

8

9

10

11

12

13

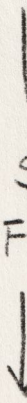
14

FREE SECTOR BIT MAP
(4 BYTES PER TRACK)

VTOC SECTOR BUFFER

```
B42E-  00          BRK
B42F-  FF          ???
B430-  F8  15      SED
B431-  00          BRK
B432-  00          BRK
B433-  FF          ???
B434-  F8  16      SED
B435-  00          BRK
B436-  00          BRK
B437-  00          BRK
B438-  00  17      BRK
B439-  00          BRK
B43A-  00          BRK
B43B-  00          BRK
B43C-  00  18      BRK
B43D-  00          BRK
B43E-  00          BRK
B43F-  00          BRK
B440-  00  19      BRK
B441-  00          BRK
B442-  00          BRK
B443-  00          BRK
B444-  00  2Ø      BRK
B445-  00          BRK
B446-  00          BRK
B447-  00          BRK
B448-  00  21      BRK
B449-  00          BRK
B44A-  00          BRK
B44B-  03          ???
B44C-  F8  22      SED
B44D-  00          BRK
B44E-  00          BRK
B44F-  00          BRK
B450-  00  23      BRK
B451-  00          BRK
B452-  00          BRK
B453-  00          BRK
B454-  38  24      SEC
B455-  00          BRK
B456-  00          BRK
B457-  00          BRK
B458-  00  25      BRK
B459-  00          BRK
B45A-  00          BRK
B45B-  7F          ???
B45C-  F8  26      SED
B45D-  00          BRK
B45E-  00          BRK
B45F-  FF          ???
B460-  F8  27      SED
B461-  00          BRK
B462-  00          BRK
B463-  1F          ???
B464-  F8  28      SED
B465-  00          BRK
B466-  00          BRK
B467-  FF          ???
B468-  F8  29      SED
B469-  00          BRK
B46A-  00          BRK
B46B-  FF          ???
B46C-  F8  3Ø      SED
```

VTOC SECTOR BUFFER



```
B46D-   00          BRK
B46E-   00          BRK
B46F-   FF          ???
B470-   F8  31      SED
B471-   00          BRK
B472-   00          BRK
B473-   1F          ???
B474-   F8  32      SED
B475-   00          BRK
B476-   00          BRK
B477-   1F          ???
B478-   F8  33      SED
B479-   00          BRK
B47A-   00          BRK
B47B-   00          BRK
B47C-   38  34      SEC
B47D-   00          BRK
B47E-   00          BRK
B47F-   00          BRK
B480-   00          BRK
B481-   00          BRK
B482-   00          BRK
B483-   00          BRK
B484-   00          BRK
B485-   00          BRK
B486-   00          BRK
B487-   00          BRK
B488-   00          BRK
B489-   00          BRK
B48A-   00          BRK
B48B-   00          BRK
B48C-   00          BRK
B48D-   00          BRK
B48E-   00          BRK
B48F-   00          BRK
B490-   00          BRK
B491-   00          BRK
B492-   00          BRK
B493-   00          BRK
B494-   00          BRK
B495-   00          BRK
B496-   00          BRK
B497-   00          BRK
B498-   00          BRK
B499-   00          BRK
B49A-   00          BRK
B49B-   00          BRK
B49C-   00          BRK
B49D-   00          BRK
B49E-   00          BRK
B49F-   00          BRK
B4A0-   00          BRK
B4A1-   00          BRK
B4A2-   00          BRK
B4A3-   00          BRK
B4A4-   00          BRK
B4A5-   00          BRK
B4A6-   00          BRK
B4A7-   00          BRK
B4A8-   00          BRK
B4A9-   00          BRK
B4AA-   00          BRK
B4AB-   00          BRK
```

VTOC SECTOR BUFFER

↓

```
B4AC-  00          BRK
B4AD-  00          BRK
B4AE-  00          BRK
B4AF-  00          BRK
B4B0-  00          BRK
B4B1-  00          BRK
B4B2-  00          BRK
B4B3-  00          BRK
B4B4-  00          BRK
B4B5-  00          BRK
B4B6-  00          BRK
B4B7-  00          BRK
B4B8-  00          BRK
B4B9-  00          BRK
B4BA-  00          BRK
B4BB-  00          BRK
B4BC-  11 0B       ORA   ($0B),Y
B4BE-  00          BRK
B4BF-  00          BRK
B4C0-  00          BRK
B4C1-  00          BRK
B4C2-  00          BRK
B4C3-  00          BRK
B4C4-  00          BRK
B4C5-  00          BRK
B4C6-  12          ???
B4C7-  0C          ???
B4C8-  81 C8       STA   ($C8,X)
B4CA-  C5 CC       CMP   $CC
B4CC-  CC CF A0    CPY   $A0CF
B4CF-  A0 A0       LDY   #$A0
B4D1-  A0 A0       LDY   #$A0
B4D3-  A0 A0       LDY   #$A0
B4D5-  A0 A0       LDY   #$A0
B4D7-  A0 A0       LDY   #$A0
B4D9-  A0 A0       LDY   #$A0
B4DB-  A0 A0       LDY   #$A0
B4DD-  A0 A0       LDY   #$A0
B4DF-  A0 A0       LDY   #$A0
B4E1-  A0 A0       LDY   #$A0
B4E3-  A0 A0       LDY   #$A0
B4E5-  A0 A0       LDY   #$A0
B4E7-  02          ???
B4E8-  00          BRK
B4E9-  13          ???
B4EA-  0C          ???
B4EB-  81 C1       STA   ($C1,X)
B4ED-  D0 D0       BNE   $B4BF
B4EF-  CC C5 D3    CPY   $D3C5
B4F2-  CF          ???
B4F3-  C6 D4       DEC   $D4
B4F5-  A0 A0       LDY   #$A0
B4F7-  A0 A0       LDY   #$A0
B4F9-  A0 A0       LDY   #$A0
B4FB-  A0 A0       LDY   #$A0
B4FD-  A0 A0       LDY   #$A0
B4FF-  A0 A0       LDY   #$A0
B501-  A0 A0       LDY   #$A0
B503-  A0 A0       LDY   #$A0
B505-  A0 A0       LDY   #$A0
B507-  A0 A0       LDY   #$A0
B509-  A0 2B       LDY   #$2B
B50B-  00          BRK
```

VTOC SECTOR BUFFER

($0B),Y } NEXT DIRECTORY SECTOR (T/S)

DIRECTORY SECTOR BUFFER (CATALOG)

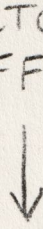
DIRECTORY ENTRY

+0 TRACK } T/S LIST
+1 SECTOR }
+2 FILE TYPE / +3 FILENAME

+33 } SECTORS IN USE
+34 }

```
B50C-   0C             ???
B50D-   0C             ???
B50E-   81 C1          STA   ($C1,X)
B510-   CE C9 CD       DEC   $CDC9
B513-   C1 CC          CMP   ($CC,X)
B515-   D3             ???
B516-   A0 A0          LDY   #$A0
B518-   A0 A0          LDY   #$A0
B51A-   A0 A0          LDY   #$A0
B51C-   A0 A0          LDY   #$A0
B51E-   A0 A0          LDY   #$A0
B520-   A0 A0          LDY   #$A0
B522-   A0 A0          LDY   #$A0
B524-   A0 A0          LDY   #$A0
B526-   A0 A0          LDY   #$A0
B528-   A0 A0          LDY   #$A0
B52A-   A0 A0          LDY   #$A0
B52C-   A0 12          LDY   #$12
B52E-   00             BRK
B52F-   18             CLC
B530-   0C             ???
B531-   84 D5          STY   $D5
B533-   D0 C4          BNE   $B4F9
B535-   C1 D4          CMP   ($D4,X)
B537-   C5 A0          CMP   $A0
B539-   B3             ???
B53A-   AE B2 A0       LDX   $A0B2
B53D-   A0 A0          LDY   #$A0
B53F-   A0 A0          LDY   #$A0
B541-   A0 A0          LDY   #$A0
B543-   A0 A0          LDY   #$A0
B545-   A0 A0          LDY   #$A0
B547-   A0 A0          LDY   #$A0
B549-   A0 A0          LDY   #$A0
B54B-   A0 A0          LDY   #$A0
B54D-   A0 A0          LDY   #$A0
B54F-   A0 09          LDY   #$09
B551-   00             BRK
B552-   19 0C 81       ORA   $810C,Y
B555-   C3             ???
B556-   CF             ???
B557-   D0 D9          BNE   $B532
B559-   A0 A0          LDY   #$A0
B55B-   A0 A0          LDY   #$A0
B55D-   A0 A0          LDY   #$A0
B55F-   A0 A0          LDY   #$A0
B561-   A0 A0          LDY   #$A0
B563-   A0 A0          LDY   #$A0
B565-   A0 A0          LDY   #$A0
B567-   A0 A0          LDY   #$A0
B569-   A0 A0          LDY   #$A0
B56B-   A0 A0          LDY   #$A0
B56D-   A0 A0          LDY   #$A0
B56F-   A0 A0          LDY   #$A0
B571-   A0 A0          LDY   #$A0
B573-   0E 00 09       ASL   $0900
B576-   0C             ???
B577-   81 C3          STA   ($C3,X)
B579-   CF             ???
B57A-   CC CF D2       CPY   $D2CF
B57D-   A0 C4          LDY   #$C4
B57F-   C5 CD          CMP   $CD
B581-   CF             ???
```

DIRECTORY SECTOR BUFFER



```
B582-  A0 A0      LDY  #$A0
B584-  A0 A0      LDY  #$A0
B586-  A0 A0      LDY  #$A0
B588-  A0 A0      LDY  #$A0
B58A-  A0 A0      LDY  #$A0
B58C-  A0 A0      LDY  #$A0
B58E-  A0 A0      LDY  #$A0
B590-  A0 A0      LDY  #$A0
B592-  A0 A0      LDY  #$A0
B594-  A0 A0      LDY  #$A0
B596-  09 00      ORA  #$00
B598-  1C         ???
B599-  0C         ???
B59A-  84 C3      STY  $C3
B59C-  C8         INY
B59D-  C1 C9      CMP  ($C9,X)
B59F-  CE A0 A0   DEC  $A0A0
B5A2-  A0 A0      LDY  #$A0
B5A4-  A0 A0      LDY  #$A0
B5A6-  A0 A0      LDY  #$A0
B5A8-  A0 A0      LDY  #$A0
B5AA-  A0 A0      LDY  #$A0
B5AC-  A0 A0      LDY  #$A0
B5AE-  A0 A0      LDY  #$A0
B5B0-  A0 A0      LDY  #$A0
B5B2-  A0 A0      LDY  #$A0
B5B4-  A0 A0      LDY  #$A0
B5B6-  A0 A0      LDY  #$A0
B5B8-  A0 03      LDY  #$03
B5BA-  00         BRK
```

DIRECTORY SECTOR BUFFER ↓

```
B5BB-  02         ???
B5BC-  00         BRK
B5BD-  01 00      ORA  ($00,X)
B5BF-  FE 01 07   INC  $0701,X
B5C2-  81 75      STA  ($75,X)
B5C4-  AA         TAX
B5C5-  00         BRK
B5C6-  00         BRK
B5C7-  00         BRK
B5C8-  98         TYA
B5C9-  00         BRK
B5CA-  97         ???
B5CB-  00         BRK
B5CC-  96 00      STX  $00,Y
B5CE-  00         BRK
B5CF-  00         BRK
B5D0-  00         BRK
```

FIO PARMLIST

+0 OPCODE
+1 SUBCODE/INIT: DOS↑
+2 → +8 VARIABLE PARMS DEPENDENT ON CALL TYPE OPCODE
+9 RETURN CODE

FIO WORKAREA ↑
SAVED IMAGE
T/S LIST BUFF ↑
DATA BUFF ↑
NEXT FILE BUFF ↑

} CURRENT FILE BUFFER PTRS

```
B5D1-  12         ??? (T)
B5D2-  0C         ??? (S)
B5D3-  12         ??? (T)
B5D4-  0C         ??? (S)
B5D5-  00         BRK
B5D6-  12         ???
B5D7-  0B         ???
B5D8-  01 00      ORA  ($00,X)
B5DA-  7A         ???
B5DB-  00         BRK
B5DC-  00         BRK
B5DD-  00         BRK
B5DE-  7A         ???
B5DF-  00         BRK
B5E0-  00         BRK
B5E1-  00         BRK
```

FIO WORK AREA

B5D1: } 1ST T/S LIST ↑
B5D2: }
B5D3: } CURR. T/S LIST ↑
B5D4: }
B5D5: FLAGS - 80 = WRITE T/S LIST, 40 = WRITE DATA, 20 = WRITE VTOC (02 = WRITE)
B5D6: } CURR. DATA SECTOR
B5D7: }
B5D8: DIRECT. SECTOR B5D9: DIRECTORY OFFSET
B5DA: } NUMBER OF SECTORS DESCRIBED BY
B5DB: } ONE T/S LIST
B5DC: } RELATIVE SECTOR # OF FIRST SECTOR IN LIST
B5DD: }
B5DE: } RELATIVE SECTOR # +1 OF LAST SECTOR IN LIST
B5DF: }
B5E0: } SECTOR LAST READ
B5E1: }

```
B5E2-  00          BRK
B5E3-  01 01       ORA   ($01,X)
B5E5-  00          BRK
B5E6-  00          BRK
B5E7-  00          BRK
B5E8-  01 00       ORA   ($00,X)
B5EA-  00          BRK
B5EB-  00          BRK
B5EC-  00          BRK
B5ED-  00          BRK
B5EE-  02          ???
B5EF-  00          BRK
B5F0-  00          BRK
B5F1-  00          BRK
B5F2-  00          BRK
B5F3-  00          BRK
B5F4-  00          BRK
B5F5-  00          BRK
B5F6-  81 70       STA   ($70,X)
B5F8-  01 FF       ORA   ($FF,X)
B5FA-  11 00       ORA   ($00),Y
B5FC-  00          BRK
B5FD-  00          BRK
B5FE-  00          BRK
B5FF-  00          BRK
```

FILE POSITION

SECTOR ALLOCATION AREA

B5E2: } SECTOR LENGTH IN BYTES
B5E3: }
B5E4/5: FILE POSITION (SECTOR OFFSET)
B5E6: BYTE OFFSET IN CURRENT SECTOR
B5E7: NOT USED
B5E8/9: RECORD LENGTH (FROM OPEN)
B5EA: } RECORD NUMBER
B5EB: }
B5EC: } BYTE OFFSET INTO RECORD
B5ED: }
B5EE: } NO. OF SECTORS IN FILE
B5EF: }
B5F0: NEXT SECTOR TO ALLOCATE
B5F1: TRACK BEING ALLOCATED
B5F2: } BIT MAP OF SECTORS FREE
B5F3: } ON CURRENT TRACK, ROTATED
B5F4: } TO NEXT SECTOR TO ALLOCATE
B5F5: }
B5F6: FILE TYPE B5F7: SLOT # *16
B5F8: DRIVE # B5F9: VOL # (COMPL.)
B5FA: TRACK #
B5FB-B5FD: UNUSED

```
B600-  F0 4A       BEQ   $B64C
B602-  99 FF FF    STA   $FFFF,Y
B605-  03          ???
B606-  3C          ???
B607-  AD FF FF    LDA   $FFFF
B60A-  FF          ???
B60B-  26 B3       ROL   $B3
B60D-  FF          ???
B60E-  FF          ???
B60F-  4D 4A 10    EOR   $104A
B612-  FF          ???
B613-  FF          ???
B614-  3D 4A CA    AND   $CA4A,X
B617-  FF          ???
B618-  FF          ???
B619-  A5 4A       LDA   $4A
B61B-  C8          INY
B61C-  FF          ???
B61D-  FF          ???
B61E-  03          ???
B61F-  4A          LSR
B620-  40          RTI
B621-  FF          ???
B622-  FF          ???
B623-  46 08       LSR   $08
B625-  91 FF       STA   ($FF),Y
B627-  FF          ???
B628-  20 33 09    JSR   $0933
B62B-  FF          ???
B62C-  FF          ???
B62D-  03          ???
B62E-  BD CC FF    LDA   $FFCC,X
B631-  FF          ???
B632-  43          ???
B633-  C8          INY
B634-  1D FF FF    ORA   $FFFF,X
B637-  20 40 07    JSR   $0740
B63A-  FF          ???
```

PAGE 3 RAM BOOT LOADER IMAGE (IN NON STANDARD FORMAT.)

STAGE ONE BOOT FROM THIS POINT

```
B63B-   FF          ???
B63C-   3E 91 29    ROL   $2991,X
B63F-   FF          ???
B640-   FF          ???
B641-   85 09       STA   $09
B643-   3C          ???
B644-   FF          ???
B645-   FF          ???
B646-   5D 00 A5    EOR   $A500,X
B649-   FF          ???
B64A-   FF          ???
B64B-   A9 1D       LDA   #$1D
B64D-   C8          INY
B64E-   FF          ???
B64F-   FF          ???
B650-   3F          ???
B651-   4A          LSR
B652-   40          RTI
B653-   FF          ???
B654-   FF          ???
B655-   85 2A       STA   $2A
B657-   91 FF       STA   ($FF),Y
B659-   FF          ???
B65A-   C0 85       CPY   #$85
B65C-   09 FF       ORA   #$FF
B65E-   FF          ???
B65F-   09 4A       ORA   #$4A
B661-   99 FF FF    STA   $FFFF,Y
B664-   4A          LSR
B665-   3C          ???
B666-   1D FF FF    ORA   $FFFF,X
B669-   4A          LSR
B66A-   85 07       STA   $07
B66C-   FF          ???
B66D-   FF          ???
B66E-   4A          LSR
B66F-   4A          LSR
B670-   29 FF       AND   #$FF
B672-   FF          ???
B673-   4A          LSR
B674-   4A          LSR
B675-   2A          ROL
B676-   FF          ???
B677-   FF          ???
B678-   8A          TXA
B679-   4A          LSR
B67A-   A5 FF       LDA   $FF
B67C-   FF          ???
B67D-   40          RTI
B67E-   08          PHP
B67F-   C8          INY
B680-   FF          ???
B681-   FF          ???
B682-   84 00       STY   $00
B684-   40          RTI
B685-   FF          ???
B686-   FF          ???
B687-   41 BD       EOR   ($BD,X)
B689-   91 FF       STA   ($FF),Y
B68B-   FF          ???
B68C-   85 00       STA   $00
B68E-   09 FF       ORA   #$FF
B690-   FF          ???
```

(DOS 3.3 PATCH)

(DOS 3.3 PATCH)

(DOS 3.3 PATCH)

PAGE 3
RAM BOOT
LOADER
IMAGE

```
B691-   03          ???
B692-   A0 66       LDY   #$66
B694-   FF          ???
B695-   FF          ???
B696-   CC 32 1D    CPY   $1D32
B699-   FF          ???
B69A-   FF          ???
B69B-   AD A2 2A    LDA   $2AA2
B69E-   FF          ???
B69F-   FF          ???
B6A0-   27          ???
B6A1-   00          BRK
B6A2-   26 FF       ROL   $FF
B6A4-   FF          ???
B6A5-   85 3E       STA   $3E
B6A7-   4A          LSR
B6A8-   FF          ???
B6A9-   FF          ???
B6AA-   09 6C       ORA   #$6C
B6AC-   3C          ???
B6AD-   FF          ???
B6AE-   FF          ???
B6AF-   A9 3F       LDA   #$3F
B6B1-   26 FF       ROL   $FF
B6B3-   FF          ???
B6B4-   2B          ???
B6B5-   E6 4A       INC   $4A
B6B7-   FF          ???
B6B8-   FF          ???
B6B9-   A6 3F       LDX   $3F
B6BB-   4A          LSR
B6BC-   FF          ???
B6BD-   FF          ???
B6BE-   F4          ???
B6BF-   85 4A       STA   $4A
B6C1-   FF          ???
B6C2-   FF          ???
B6C3-   D0 03       BNE   $B6C8
B6C5-   4A          LSR
B6C6-   60          RTS
B6C7-   FF          ???
B6C8-   C8          INY
B6C9-   CC 08 2B    CPY   $2B08
B6CC-   FF          ???
B6CD-   08          PHP
B6CE-   AD 66 A6    LDA   $A666
B6D1-   FF          ???
B6D2-   00          BRK
B6D3-   3E BD 40    ROL   $40BD,X
B6D6-   FF          ???
B6D7-   99 85 C8    STA   $C885,Y
B6DA-   91 FF       STA   ($FF),Y
B6DC-   0A          ASL
B6DD-   ED 40 09    SBC   $0940
B6E0-   FF          ???
B6E1-   0A          ASL
B6E2-   D0 91       BNE   $B675
B6E4-   FF          ???
B6E5-   FF          ???
B6E6-   0A          ASL
B6E7-   3D 09 0D    AND   $0D09,X
B6EA-   FF          ???
B6EB-   08          PHP
```

DOS 3.3 PATCH

PAGE 3
RAM BOOT
LOADER
IMAGE

```
B6EC-   E6 33       INC   $33
B6EE-   4A          LSR
B6EF-   FF          ???
B6F0-   00          BRK
B6F1-   41 1D       EOR   ($1D,X)
B6F3-   4A          LSR
B6F4-   FF          ???
B6F5-   B9 E6 2A    LDA   $2AE6,Y
B6F8-   4A          LSR
B6F9-   FF          ???
B6FA-   99 06 26    STA   $2606,Y
B6FD-   08          PHP
B6FE-   36 48       ROL   $48,X
```

$3CC: FIRST PAGE OF FIRST STAGE DOS BOOT LOAD ($B6)

END OF $300 RAM BOOTSTRAP

DOS 2ND STAGE BOOT LOADER

```
B700-   8E E9 B7    STX   $B7E9   } SET SLOT #'S IN RWTS PARMS
B703-   8E F7 B7    STX   $B7F7   }
B706-   A9 01       LDA   #$01    } PREVIOUS DRIVE MUST BE 1
B708-   8D F8 B7    STA   $B7F8   }
B70B-   8D EA B7    STA   $B7EA   THIS DRIVE TOO
B70E-   AD E0 B7    LDA   $B7E0   } # PAGES IN SECOND LOAD
B711-   8D E1 B7    STA   $B7E1   }
B714-   A9 00       LDA   #$00    } TRACK 0
B716-   8D EC B7    STA   $B7EC   }
B719-   AD E2 B7    LDA   $B7E2   } SECTOR 10 (DOS 3.3 PATCH)
B71C-   8D ED B7    STA   $B7ED   }
B71F-   AD E3 B7    LDA   $B7E3   } LOAD ADDRESS OF DOS
B722-   8D F1 B7    STA   $B7F1   }
B725-   A9 01       LDA   #$01    } READING (OPCODE)
B727-   8D F4 B7    STA   $B7F4   }
B72A-   8A          TXA           }
B72B-   4A          LSR           }
B72C-   4A          LSR           } GET TRUE SLOT #
B72D-   4A          LSR           }
B72E-   4A          LSR           }
B72F-   AA          TAX           }
B730-   A9 00       LDA   #$00    }
B732-   9D F8 04    STA   $04F8,X } SET REMEMBERED CURR. TRKS
B735-   9D 78 04    STA   $0478,X }
B738-   20 93 B7    JSR   $B793   GO READ DOS
B73B-   A2 FF       LDX   #$FF    } BRAND NEW STACK
B73D-   9A          TXS           }
B73E-   8E EB B7    STX   $B7EB   ANY VOL WILL DO
B741-   20 93 FE    JSR   $FE93   SET VIDEO (DOS 3.3 PATCH)
B744-   20 89 FE    JSR   $FE89   SET KEYBOARD
B747-   4C 84 9D    JMP   $9D84   GO TO DOS COLDSTART (1BD3 @ BOOT-RELOC!)
```

PUT DOS ON TRKS 0-2

```
B74A-   AD F1 B7    LDA   $B7F1   } SET PAGE OF DOS LOAD POINT
B74D-   8D E3 B7    STA   $B7E3   }
B750-   38          SEC           }
B751-   AD E7 B7    LDA   $B7E7   } COMPUTE NO. OF PAGES IN DOS
B754-   ED E3 B7    SBC   $B7E3   } SECOND STAGE BOOT (25)
B757-   8D E0 B7    STA   $B7E0   }
B75A-   A9 00       LDA   #$00
B75C-   8D EC B7    STA   $B7EC   TRACK 0
B75F-   8D ED B7    STA   $B7ED   SECTOR 0
B762-   8D F0 B7    STA   $B7F0   }
B765-   AD E7 B7    LDA   $B7E7   } WRITE FROM 1ST STAGE BOOT ($B600)
B768-   8D F1 B7    STA   $B7F1   }
B76B-   8D FE B6    STA   $B6FE   TELL RAM BOOTER WHERE IT GOES
B76E-   A9 0A       LDA   #$0A    } 10 SECTORS TO WRITE
B770-   8D E1 B7    STA   $B7E1   }
B773-   8D E2 B7    STA   $B7E2   SET # SECTORS IN LOAD ONE
B776-   A9 48       LDA   #$48    SAME IN 3 PAGE
B778-   8D FF B6    STA   $B6FF
B77B-   A9 02       LDA   #$02    }
```

DOS 3.3 PATCH

```
B77D-  8D F4 B7    STA  $B7F4   } SET RWTS WRITE OPCODE
B780-  20 93 B7    JSR  $B793     WRITE FIRST STAGE
B783-  AD E3 B7    LDA  $B7E3   } POINT TO DOS SECOND STAGE BOOT LOAD
B786-  8D F1 B7    STA  $B7F1   }
B789-  AD E0 B7    LDA  $B7E0   } NUMBER OF SECTORS TO WRITE
B78C-  8D E1 B7    STA  $B7E1   }
B78F-  20 93 B7    JSR  $B793     WRITE SECOND STAGE
B792-  60          RTS
```

READ or WRITE A GROUP OF PAGES

```
B793-  AD E5 B7    LDA  $B7E5   } POINT TO PARMLIST
B796-  AC E4 B7    LDY  $B7E4   }
B799-  20 B5 B7    JSR  $B7B5     AND CALL RWTS
B79C-  AC ED B7    LDY  $B7ED   } NEXT SECTOR
B79F-  C8          INY          }
B7A0-  C0 0D       CPY  #$0D      END OF TRACK?
B7A2-  D0 05       BNE  $B7A9     NO
B7A4-  A0 00       LDY  #$00      YES, SECTOR 0
B7A6-  EE EC B7    INC  $B7EC     NEXT TRACK
B7A9-  8C ED B7    STY  $B7ED     SET SECTOR
B7AC-  EE F1 B7    INC  $B7F1     NEXT DATA PAGE
B7AF-  CE E1 B7    DEC  $B7E1   } DEC & CHECK # OF SECTORS LEFT
B7B2-  D0 DF       BNE  $B793   }
B7B4-  60          RTS
```

DISABLE AND CALL RWTS

EXTERNAL RWTS E

```
*B7B5-  08         PHP          SAVE S REG
*B7B6-  78         SEI          DISABLE INTERRUPTS
*B7B7-  20 00 BD   JSR  $BD00   AND CALL RWTS
*B7BA-  B0 03      BCS  $B7BF
*B7BC-  28         PLP          }
*B7BD-  18         CLC          } RESTORE S REG (REENABLING INTERRUPTS)
*B7BE-  60         RTS          } AND PASS BACK CARRY AS ERROR
*B7BF-  28         PLP          } INDICATOR.
*B7C0-  38         SEC          }
*B7C1-  60         RTS
```

SET RWTS PARMS FOR WRITING DOS

```
*B7C2-  AD BC B5   LDA  $B5BC   } SET RWTS BUFFER
*B7C5-  8D F1 B7   STA  $B7F1   } TO DOS LOAD POINT
*B7C8-  A9 00      LDA  #$00    }
*B7CA-  8D F0 B7   STA  $B7F0   }
*B7CD-  AD F9 B5   LDA  $B5F9   } SET PROPER RWTS VOL #
*B7D0-  49 FF      EOR  #$FF    }
*B7D2-  8D EB B7   STA  $B7EB   }
*B7D5-  60         RTS
```

ZERO CURRENT BUFFER

```
*B7D6-  A9 00      LDA  #$00
*B7D8-  A8         TAY
*B7D9-  91 42      STA  ($42),Y  } ZERO 256
*B7DB-  C8         INY           } BYTES
*B7DC-  D0 FB      BNE  $B7D9    }
*B7DE-  60         RTS
```

```
B7DF-  00          BRK
B7E0-  1B          ???          B7E0: NUMBER OF PAGES IN SECOND DOS LOAD
B7E1-  00          BRK          B7E1: NUMBER OF SECTORS TO WRITE
B7E2-  0A          ASL          B7E2: NUMBER OF PAGES IN FIRST DOS LOAD
B7E3-  1B          ???          B7E3: INIT DOS PAGE COUNTER
B7E4-  E8          INX          B7E4:  } ↑ RWTS PARMS
B7E5-  B7          ???             5:  }
B7E6-  00          BRK          B7E6: ↑ FIRST STAGE BOOT LOCATION
B7E7-  B6 01       LDX  $01,Y   B7E8: IOB TYPE (01)
B7E9-  70 01       BVS  $B7EC   B7E9: S*16  B7EA: DRIVE
B7EB-  FF          ???          B7EB: VOL # EXPECTED
B7EC-  12          ???          B7EC: TRACK TO USE
B7ED-  0B          ???          B7ED: SECTOR TO USE
B7EE-  FB          ???          B7EE:  } ↑ DEVICE CHARACTERISTICS TABLE
B7EF-  B7          ???             F:  }
B7F0-  00          BRK          B7F0:  } ↑ DATA BUFFER (256 BYTES)
B7F1-  96 00       STX  $00,Y      1:  }
```

RWTS PARMLIST

* 25 - SLAVE
27 - MASTER

```
B7F3-  01 D1      ORA   ($01,X)     B7F2/3: SECTOR SIZE B7F4: COMMAND CODE
B7F5-  00         BRK                B7F5: RETURN CODE
B7F6-  FE 70 01   INC   $0170,X      B7F6: VOL FOUND. B7F7: PREVIOUS SLOT ? DRIVE #
B7F9-  00         BRK
B7FA-  00         BRK
B7FB-  00         BRK                B7FB: DEVICE TYPE
B7FC-  01 EF      ORA   ($EF,X)      B7FC: PHASES PER TRK
B7FE-  D8         CLD                B7FD/E: MOTOR ON TIME COUNT
B7FF-  00         BRK
```

DEVICE CHARAT. TABLE

```
B800-  A2 32      LDX   #$32         OUTPUT INDEX
B802-  A0 00      LDY   #$00         INPUT INDEX
B804-  B1 3E      LDA   ($3E),Y      GET DATA BYTE
B806-  85 26      STA   $26          A1A2A3A4 A5A6A7A8 .
B808-  4A         LSR
B809-  4A         LSR
B80A-  4A         LSR
B80B-  9D 00 BB   STA   $BB00,X      000A. A2A3A4A5 #1
B80E-  C8         INY                NEXT DATA BYTE
B80F-  B1 3E      LDA   ($3E),Y      B1B2B3B4 B5B6B7B8
B811-  85 27      STA   $27
B813-  4A         LSR
B814-  4A         LSR
B815-  4A         LSR
B816-  9D 33 BB   STA   $BB33,X      000B1 B2B3B4B5 #2
B819-  C8         INY                NEXT DATA BYTE
B81A-  B1 3E      LDA   ($3E),Y      C1C2C3C4 C5C6C7C8
B81C-  85 2A      STA   $2A
B81E-  4A         LSR
B81F-  4A         LSR
B820-  4A         LSR
B821-  9D 66 BB   STA   $BB66,X      000C1 C2C3C4C5 #3
B824-  C8         INY                NEXT DATA BYTE
B825-  B1 3E      LDA   ($3E),Y      D1D2D3D4 D5D6D7D8
B827-  4A         LSR                0D1D2D3 D4D5D6D7   CARRY = D8
B828-  26 2A      ROL   $2A          C2C3C4C5 C6C7C8D8
B82A-  4A         LSR                00D1D2 D3D4D5D6    C = D7
B82B-  26 27      ROL   $27          B2B3B4B5 B6B7B8D7
B82D-  4A         LSR                000D1 D2D3D4D5     C = D6
B82E-  26 26      ROL   $26          A2A3A4A5 A6A7A8D6
B830-  9D 99 BB   STA   $BB99,X      000D1 D2D3D4D5 #4
B833-  C8         INY                NEXT DATA BYTE
B834-  B1 3E      LDA   ($3E),Y      E1E2E3E4 E5E6E7E8
B836-  4A         LSR                0E1E2E3 E4E5E6E7   C=E8
B837-  26 2A      ROL   $2A          C3C4C5C6 C7C8D8E8
B839-  4A         LSR                00E1E2 E3E4E5E6    C=E7
B83A-  26 27      ROL   $27          B3B4B5B6 B7B8D7E7
B83C-  4A         LSR                000E1 E2E3E4E5     C=E6
B83D-  9D CC BB   STA   $BBCC,X      000E1 E2E3E4E5 #5
B840-  A5 26      LDA   $26          A2A3A4A5 A6A7A8D6
B842-  2A         ROL                A3A4A5A6 A7A8D6E6
B843-  29 1F      AND   #$1F
B845-  9D 00 BC   STA   $BC00,X      000A6 A7A8D6E6
B848-  A5 27      LDA   $27          B3B4B5B6 B7B8D7E7
B84A-  29 1F      AND   #$1F
B84C-  9D 33 BC   STA   $BC33,X      000B6 B7B8D7E7
B84F-  A5 2A      LDA   $2A          C3C4C5C6 C7C8D8E8
B851-  29 1F      AND   #$1F
B853-  9D 66 BC   STA   $BC66,X      000C6 C7C8D8E8
B856-  C8         INY
B857-  CA         DEX                DO 51 GROUPS OF 5 BYTES (255)
B858-  10 AA      BPL   $B804
B85A-  B1 3E      LDA   ($3E),Y      GET LAST DATA BYTE
B85C-  AA         TAX
```

CONVERT DATA FOR WRITE
8 BIT BYTES TO 5 BIT NIBBLES

BUILD PRIMARY BUFFER

BUILD SECONDARY BUFFER

```
B85D-  29 07      AND  #$07
B85F-  8D 99 BC   STA  $BC99     STORE LAST 3 BITS IN SECONDARY BUFF
B862-  8A         TXA
B863-  4A         LSR
B864-  4A         LSR
B865-  4A         LSR
B866-  8D FF BB   STA  $BBFF     AND FIRST 5 BITS IN PRIMARY BUFF
B869-  60         RTS            DONE
```

WRITE SECTOR DATA

DATA IS IN 5 & 3 FORM

```
B86A-  38         SEC            ASSUME ERROR
B86B-  BD 8D C0   LDA  $C08D,X   SENSE WRITE PROTECT
B86E-  BD 8E C0   LDA  $C08E,X   SET READ MODE
B871-  30 7C      BMI  $B8EF     WRITE PROTECTED!
B873-  86 27      STX  $27       SAVE SLOT/DRIVE
B875-  8E 78 06   STX  $0678
B878-  AD 00 BC   LDA  $BC00     INITIALIZE CHECKSUM
B87B-  85 26      STA  $26
B87D-  A9 FF      LDA  #$FF      WRITING SYNCS
B87F-  9D 8F C0   STA  $C08F,X   SET WRITE MODE
B882-  1D 8C C0   ORA  $C08C,X   START WRITING
B885-  48         PHA
B886-  68         PLA            (TIMING)
B887-  EA         NOP
B888-  A0 0A      LDY  #$0A      WRITE 10 MORE SYNC'S BEFORE DATA
B88A-  05 26      ORA  $26       (TIMING)
B88C-  20 F4 B8   JSR  $B8F4     WRITE NIBBLE
B88F-  88         DEY            DO 10
B890-  D0 F8      BNE  $B88A
B892-  A9 D5      LDA  #$D5      (D5)
B894-  20 F3 B8   JSR  $B8F3
B897-  A9 AA      LDA  #$AA      (AA)   WRITE SECTOR DATA PROLOGUE
B899-  20 F3 B8   JSR  $B8F3
B89C-  A9 AD      LDA  #$AD      (AD)
B89E-  20 F3 B8   JSR  $B8F3
B8A1-  98         TYA            START WITH Ø Acc
B8A2-  A0 9A      LDY  #$9A      DO SECONDARY 154 BYTE BUFFER FIRST
B8A4-  D0 03      BNE  $B8A9
B8A6-  B9 00 BC   LDA  $BC00,Y   GET DATA BYTE
B8A9-  59 FF BB   EOR  $BBFF,Y   XOR WITH PREVIOUS
B8AC-  AA         TAX
B8AD-  BD 9A BC   LDA  $BC9A,X   TRANSLATE TO DISK CODE
B8B0-  A6 27      LDX  $27       GET SLOT #
B8B2-  9D 8D C0   STA  $C08D,X   WRITE IT
B8B5-  BD 8C C0   LDA  $C08C,X
B8B8-  88         DEY            DO 153
B8B9-  D0 EB      BNE  $B8A6     } WRITE 154 BYTE SECONDARY BUFFER
B8BB-  A5 26      LDA  $26       START WITH FIRST BYTE OF SECONDARY
B8BD-  EA         NOP
B8BE-  59 00 BB   EOR  $BB00,Y   MERGE WITH NEXT DATA
B8C1-  AA         TAX
B8C2-  BD 9A BC   LDA  $BC9A,X   TRANSLATE
B8C5-  AE 78 06   LDX  $0678
B8C8-  9D 8D C0   STA  $C08D,X   AND WRITE IT
B8CB-  BD 8C C0   LDA  $C08C,X
B8CE-  B9 00 BB   LDA  $BB00,Y   PREVIOUS DATA
B8D1-  C8         INY            DO 256
B8D2-  D0 EA      BNE  $B8BE     } WRITE 256 BYTE PRIMARY BUFFER
B8D4-  AA         TAX
B8D5-  BD 9A BC   LDA  $BC9A,X   TRANSLATE CHECKSUM
B8D8-  A6 27      LDX  $27
B8DA-  20 F6 B8   JSR  $B8F6     WRITE IT
B8DD-  A9 DE      LDA  #$DE      (DE)
B8DF-  20 F3 B8   JSR  $B8F3
B8E2-  A9 AA      LDA  #$AA      (AA)   WRITE SECTOR DATA EPILOGUE
```

```
B8E4-  20 F3 B8     JSR   $B8F3
B8E7-  A9 EB        LDA   #$EB        (EB)
B8E9-  20 F3 B8     JSR   $B8F3
B8EC-  BD 8E C0     LDA   $C08E,X     SET READ MODE AGAIN
B8EF-  BD 8C C0     LDA   $C08C,X
B8F2-  60           RTS
```

```
B8F3-  18           CLC               (TIMING)
B8F4-  48           PHA
B8F5-  68           PLA
B8F6-  9D 8D C0     STA   $C08D,X     WRITE DATA IN LATCH
B8F9-  1D 8C C0     ORA   $C08C,X     CLEAR LATCH
B8FC-  60           RTS
```

WRITE ONE 5 BIT NIBBL

```
B8FD-  A0 20        LDY   #$20        GIVE IT 32 TRIES
B8FF-  88        ->DEY                TO FIND (D5)
B900-  F0 61        BEQ   $B963       IF NOT FOUND, SECTOR EMPTY
B902-  BD 8C C0  ->LDA   $C08C,X      GET DATA BYTE
B905-  10 FB     <-BPL   $B902        NOT YET
B907-  49 D5     ->EOR   #$D5         (D5) ?
B909-  D0 F4     <-BNE   $B8FF        NO
B90B-  EA           NOP
B90C-  BD 8C C0  ->LDA   $C08C,X      NEXT
B90F-  10 FB     <-BPL   $B90C
B911-  C9 AA        CMP   #$AA        (AA) ?
B913-  D0 F2        BNE   $B907
B915-  A0 9A        LDY   #$9A        BYTE CTR FOR LATER
B917-  BD 8C C0  ->LDA   $C08C,X
B91A-  10 FB     <-BPL   $B917
B91C-  C9 AD        CMP   #$AD        (AD) ?
B91E-  D0 E7        BNE   $B907
B920-  A9 00        LDA   #$00        START CHECKSUM
B922-  88        ->DEY
B923-  84 26        STY   $26
B925-  BC 8C C0  ->LDY   $C08C,X      GET NEXT
B928-  10 FB     <-BPL   $B925
B92A-  59 00 BA     EOR   $BA00,Y     TRANSLATE TO 5 BIT & XOR WITH PREVIOUS
B92D-  A4 26        LDY   $26
B92F-  99 00 BC     STA   $BC00,Y     PUT IN BUFFER
B932-  D0 EE        BNE   $B922       DO 154
B934-  84 26     ->STY   $26
B936-  BC 8C C0  ->LDY   $C08C,X      NEXT
B939-  10 FB     <-BPL   $B936
B93B-  59 00 BA     EOR   $BA00,Y     XLATE + XOR
B93E-  A4 26        LDY   $26
B940-  99 00 BB     STA   $BB00,Y     STORE
B943-  C8           INY               DO 256
B944-  D0 EE        BNE   $B934
B946-  BC 8C C0  ->LDY   $C08C,X      GET CHECKSUM
B949-  10 FB     <-BPL   $B946
B94B-  D9 00 BA     CMP   $BA00,Y     IS IT OK?
B94E-  D0 13        BNE   $B963       NO, ERROR
B950-  BD 8C C0     LDA   $C08C,X
B953-  10 FB        BPL   $B950       (DE)
B955-  C9 DE        CMP   #$DE
B957-  D0 0A        BNE   $B963
B959-  EA           NOP
B95A-  BD 8C C0     LDA   $C08C,X     (AA)
B95D-  10 FB        BPL   $B95A
B95F-  C9 AA        CMP   #$AA
B961-  F0 5C        BEQ   $B9BF       NO ERRORS, EXIT
B963-  38        ->SEC                ERROR EXIT
B964-  60           RTS
```

READ SECTOR DATA

GIVE IT 32 TRIES TO FIND (D5) — IF NOT FOUND, SECTOR EMPTY

READS 5 BIT NIBBLES

FIND DATA PROLOGUE

READ SECOND. BUFFER

READ PRIMARY BUFFER

VERIFY PART OF EPILOGUE

```
B965-  A0 F8        LDY   #$F8        GIVE IT 8*256
B967-  84 26        STY   $26         TRIES TO FIND A
```

READ SECTOR ADDRESS HEADER

```
B969-  C8          INY          COUNT TRIES
B96A-  D0 04       BNE  $B970
B96C-  E6 26       INC  $26     CYCLE 8 TIMES
B96E-  F0 F3       BEQ  $B963   THEN GIVE UP
B970-  BD 8C C0 ↱  LDA  $C08C,X LOOK FOR...
B973-  10 FB    └  BPL  $B970
B975-  C9 D5       CMP  #$D5    (D5)
B977-  D0 F0       BNE  $B969
B979-  EA          NOP
B97A-  BD 8C C0 ↱  LDA  $C08C,X
B97D-  10 FB    └  BPL  $B97A
B97F-  C9 AA       CMP  #$AA    (AA)
B981-  D0 F2       BNE  $B975
B983-  A0 03       LDY  #$03    INIT Y=3
B985-  BD 8C C0 ↱  LDA  $C08C,X
B988-  10 FB    └  BPL  $B985
B98A-  C9 B5       CMP  #$B5    (B5)
B98C-  D0 E7       BNE  $B975
B98E-  A9 00       LDA  #$00
B990-  85 27    ↱  STA  $27
B992-  BD 8C C0 ↱  LDA  $C08C,X GET 1ST NIBBLE
B995-  10 FB    └  BPL  $B992
B997-  2A          ROL          SHIFT TO EVEN BITS
B998-  85 26       STA  $26
B99A-  BD 8C C0 ↱  LDA  $C08C,X GET 2ND NIBBLE
B99D-  10 FB    └  BPL  $B99A
B99F-  25 26       AND  $26     COMBINE THEM
B9A1-  99 2C 00    STA  $002C,Y AND SAVE
B9A4-  45 27       EOR  $27     KEEP CHECKSUM
B9A6-  88          DEY          DO 4 BYTES
B9A7-  10 E7    └  BPL  $B990
B9A9-  A8          TAY          CHECKSUM OK?
B9AA-  D0 B7       BNE  $B963
B9AC-  BD 8C C0    LDA  $C08C,X
B9AF-  10 FB       BPL  $B9AC   (DE)
B9B1-  C9 DE       CMP  #$DE
B9B3-  D0 AE       BNE  $B963
B9B5-  EA          NOP
B9B6-  BD 8C C0    LDA  $C08C,X
B9B9-  10 FB       BPL  $B9B6   (AA)
B9BB-  C9 AA       CMP  #$AA
B9BD-  D0 A4       BNE  $B963
B9BF-  18          CLC          NO ERROR EXIT
B9C0-  60          RTS
```

SEARCH FOR A SECTOR ADDRESS HEADER PROLOGUE

READ SECTOR ADDRESS INFORMATION

2C = CHECKSUM
2D = SECTOR #
2E = TRACK #
2F = VOL ID #

VERIFY PART OF EPILOGUE

```
B9C1-  A2 32       LDX  #$32    INPUT INDEX
B9C3-  A0 00       LDY  #$00    OUTPUT INDEX
B9C5-  BD 00 BC ↱  LDA  $BC00,X A6A7A8D6 E6000
B9C8-  4A          LSR
B9C9-  4A          LSR
B9CA-  4A          LSR          000A6 A7A8D6E6
B9CB-  85 27       STA  $27
B9CD-  4A          LSR
B9CE-  85 26       STA  $26     0000 A6A7A8D6
B9D0-  4A          LSR          0000 0A6A7A8
B9D1-  1D 00 BB    ORA  $BB00,X [A1A2A3A4 A5A6A7A8]
B9D4-  91 3E       STA  ($3E),Y STORE IN BUFFER  #1
B9D6-  C8          INY
B9D7-  BD 33 BC    LDA  $BC33,X B6B7B8D7 E7000
B9DA-  4A          LSR
B9DB-  4A          LSR
B9DC-  4A          LSR
B9DD-  4A          LSR          0000 B6B7B8D7   C=E7
B9DE-  26 27       ROL  $27     00A6A7 A8D6E6E7
```

CONVERT DATA READ
5 BIT NIBBLES T
8 BIT BYTES

```
B9E0-   4A          LSR          OOOO OB6B7B8   C=D7
B9E1-   26 26       ROL  $26     OOOA6 A7A8D6D7
B9E3-   1D 33 BB    ORA  $BB33,X B1B2B3B4 B5B6B7B8
B9E6-   91 3E       STA  ($3E),Y STORE IN BUFFER  #2
B9E8-   C8          INY
B9E9-   BD 66 BC    LDA  $BC66,X C6C7C8D8 E8OOO
B9EC-   4A          LSR
B9ED-   4A          LSR
B9EE-   4A          LSR
B9EF-   4A          LSR          OOOO C6C7C8D8   C=E8
B9F0-   26 27       ROL  $27     OA6A7A8 D6E6E7E8
B9F2-   4A          LSR          OOOO OC6C7C8   C=D8
B9F3-   26 26       ROL  $26     OOA6A7 A8D6D7D8
B9F5-   1D 66 BB    ORA  $BB66,X C1C2C3C4 C5C6C7C8
B9F8-   91 3E       STA  ($3E),Y STORE IN BUFFER  #3
B9FA-   C8          INY
B9FB-   A5 26       LDA  $26     OOA6A7 A8D6D7D8
B9FD-   29 07       AND  #$07    OOOO OD6D7D8
B9FF-   1D 99 BB    ORA  $BB99,X D1D2D3D4 D5D6D7D8
BA02-   91 3E       STA  ($3E),Y STORE IN BUFFER  #4
BA04-   C8          INY
BA05-   A5 27       LDA  $27     OA6A7A8 D6E6E7E8
BA07-   29 07       AND  #$07    OOOO OE6E7E8
BA09-   1D CC BB    ORA  $BBCC,X E1E2E3E4 E5E6E7E8
BA0C-   91 3E       STA  ($3E),Y STORE IN BUFFER  #5
BA0E-   C8          INY
BA0F-   CA          DEX          DO 51 GROUPS OF 5 (255)
BA10-   10 B3       BPL  $B9C5
BA12-   AD 99 BC    LDA  $BC99   GET LAST 3 BITS OF LAST BYTE
BA15-   4A          LSR
BA16-   4A          LSR
BA17-   4A          LSR
BA18-   0D FF BB    ORA  $BBFF   COMBINE WITH FIRST 5 BITS
BA1B-   91 3E       STA  ($3E),Y AND STORE IN BUFFER
BA1D-   60          RTS          EXIT
BA1E-   85 2A       STA  $2A     SAVE WANTED TRK
BA20-   CD 78 04    CMP  $0478   ALREADY THERE?
BA23-   F0 59       BEQ  $BA7E
BA25-   86 2B       STX  $2B     SAVE SLOT/DRIVE
BA27-   A9 00       LDA  #$00    INIT. LOOP COUNT
BA29-   85 26       STA  $26
BA2B-   AD 78 04    LDA  $0478   GET OLD TRK
BA2E-   85 27       STA  $27
BA30-   38          SEC          CURR_TRK - NEW_TRK
BA31-   E5 2A       SBC  $2A
BA33-   F0 42       BEQ  $BA77   WE'RE THERE
BA35-   B0 07       BCS  $BA3E   CURR > NEW (MOVE ARM OUT)
BA37-   49 FF       EOR  #$FF    CURR < NEW (MOVE ARM IN)
BA39-   EE 78 04    INC  $0478
BA3C-   90 05       BCC  $BA43   COMPUTE |CURR-NEW|
BA3E-   69 FE       ADC  #$FE
BA40-   CE 78 04    DEC  $0478
BA43-   C5 26       CMP  $26
BA45-   90 02       BCC  $BA49   USE MINIMUM(CURR-NEW, LOOPCOUNT)
BA47-   A5 26       LDA  $26
BA49-   C9 0C       CMP  #$0C    ARM MOVE. TABLE ONLY HAS 12 ENTRIES
BA4B-   90 02       BCC  $BA4F
BA4D-   A9 0B       LDA  #$0B
BA4F-   A8          TAY
BA50-   AD 78 04    LDA  $0478   CONSTRUCT PROPER PHASE SELECT
BA53-   29 03       AND  #$03
BA55-   0A          ASL
BA56-   05 2B       ORA  $2B     ADD SLOT/DRIVE
```

DOS 3.2.1

DOS 3.2.1

DOS 3.2.1

SEEK ARM TO ABSOLUTE TRACK IN Acc

Acc = phases (usually two per tr

$478 = current arm position

```
BA58-  AA          TAX
BA59-  BD 81 C0    LDA   $C081,X   TURN PHASES ON TO MOVE ARM
BA5C-  B9 90 BA    LDA   $BA90,Y   GET PROPER DELAY FACTOR
BA5F-  20 7F BA    JSR   $BA7F     DELAY
BA62-  A5 27       LDA   $27
BA64-  29 03       AND   #$03      CONSTRUCT PHASE OFF SELECT
BA66-  0A          ASL
BA67-  05 2B       ORA   $2B
BA69-  AA          TAX
BA6A-  BD 80 C0    LDA   $C080,X   TURN MOTOR PHASE OFF
BA6D-  B9 9C BA    LDA   $BA9C,Y   AND DELAY
BA70-  20 7F BA    JSR   $BA7F
BA73-  E6 26       INC   $26       NEXT CYCLE
BA75-  D0 B4       BNE   $BA2B
BA77-  A9 FF       LDA   #$FF      DELAY (FUDGE FACTOR)
BA79-  20 7F BA    JSR   $BA7F
BA7C-  A6 2B       LDX   $2B       RETURN WITH SLOT/DRIVE STILL IN X
BA7E-  60          RTS
```

DOS 3.2.1

```
BA7F-  A2 11       LDX   #$11      ARM MOVE DELAY SUBRT
BA81-  CA          DEX
BA82-  D0 FD       BNE   $BA81
BA84-  E6 46       INC   $46       $46,$47 COUNT TIME SPENT SEEKING
BA86-  D0 02       BNE   $BA8A
BA88-  E6 47       INC   $47
BA8A-  38          SEC
BA8B-  E9 01       SBC   #$01
BA8D-  D0 F0       BNE   $BA7F
BA8F-  60          RTS
```

ARM MOVEMENT DELAY TABLE

```
BA90-  01 30       ORA   ($30,X)   } ACCELERATE
BA92-  28          PLP             }
BA93-  24 20       BIT   $20       }
BA95-  1E 1D 1C    ASL   $1C1D,X    }
BA98-  1C          ???             }
BA99-  1C          ???             }
BA9A-  1C          ???             }
BA9B-  1C          ???             }
BA9C-  70 2C       BVS   $BACA     } DECELERATE
BA9E-  26 22       ROL   $22       }
BAA0-  1F          ???             }
BAA1-  1E 1D 1C    ASL   $1C1D,X    }
BAA4-  1C          ???             }
BAA5-  1C          ???             }
BAA6-  1C          ???             }
BAA7-  1C          ???             }
```

DISK CODE TO 5 BIT (READ) TRANSLATE TABLE

(SHIFTED 5 BIT XXXX X000)

```
BAA8-  00          BRK
BAA9-  00          BRK
BAAA-  00          BRK
BAAB-  00          BRK
BAAC-  01 08       ORA   ($08,X)
BAAE-  10 18       BPL   $BAC8
BAB0-  02          ???
BAB1-  03          ???
BAB2-  04          ???
BAB3-  05 06       ORA   $06
BAB5-  20 28 30    JSR   $3028
BAB8-  07          ???
BAB9-  09 38       ORA   #$38
BABB-  40          RTI
BABC-  0A          ASL
BABD-  48          PHA
BABE-  50 58       BVC   $BB18
BAC0-  0B          ???
BAC1-  0C          ???
```

```
BAC2-   0D 0E 0F    ORA   $0F0E
BAC5-   11 12       ORA   ($12),Y
BAC7-   13          ???
BAC8-   14          ???
BAC9-   15 16       ORA   $16,X
BACB-   17          ???
BACC-   19 1A 1B    ORA   $1B1A,Y
BACF-   1C          ???
BAD0-   1D 1E 21    ORA   $211E,X
BAD3-   22          ???
BAD4-   23          ???
BAD5-   24 60       BIT   $60
BAD7-   68          PLA
BAD8-   25 26       AND   $26
BADA-   70 78       BVS   $BB54
BADC-   27          ???
BADD-   80          ???
BADE-   88          DEY
BADF-   90 29       BCC   $BB0A
BAE1-   2A          ROL
BAE2-   2B          ???
BAE3-   2C 2D 2E    BIT   $2E2D
BAE6-   2F          ???
BAE7-   31 32       AND   ($32),Y
BAE9-   33          ???
BAEA-   98          TYA
BAEB-   A0 34       LDY   #$34
BAED-   A8          TAY
BAEE-   B0 B8       BCS   $BAA8
BAF0-   35 36       AND   $36,X
BAF2-   37          ???
BAF3-   39 3A C0    AND   $C03A,Y
BAF6-   C8          INY
BAF7-   D0 3B       BNE   $BB34
BAF9-   3C          ???
BAFA-   D8          CLD
BAFB-   E0 3E       CPX   #$3E
BAFD-   E8          INX
BAFE-   F0 F8       BEQ   $BAF8
```

READ TRANSLATE TABLE CONTINUED

```
BB00-   00          BRK
BB01-   00          BRK
BB02-   00          BRK
BB03-   00          BRK
BB04-   00          BRK
BB05-   00          BRK
BB06-   00          BRK
BB07-   00          BRK
BB08-   00          BRK
BB09-   00          BRK
BB0A-   00          BRK
BB0B-   00          BRK
BB0C-   00          BRK
BB0D-   00          BRK
BB0E-   00          BRK
BB0F-   00          BRK
BB10-   00          BRK
BB11-   00          BRK
BB12-   00          BRK
BB13-   00          BRK
BB14-   C8          INY
BB15-   D0 A0       BNE   $BAB7
BB17-   C0 B0       CPY   #$B0
BB19-   C8          INY
```

256 BYTE PRIMARY DATA BUFFER (5 BIT FORMAT)

CONTAINS FIRST 5 BITS OF ALL BYTES

```
BB1A-   D0 28     BNE   $BB44
BB1C-   18        CLC
BB1D-   B0 A8     BCS   $BAC7
BB1F-   00        BRK
BB20-   00        BRK
BB21-   00        BRK
BB22-   A0 D0     LDY   #$D0
BB24-   00        BRK
BB25-   00        BRK
BB26-   28        PLP
BB27-   C8        INY
BB28-   D0 C8     BNE   $BAF2
BB2A-   08        PHP
BB2B-   18        CLC
BB2C-   C8        INY
BB2D-   C0 00     CPY   #$00
BB2F-   00        BRK
BB30-   A8        TAY
BB31-   48        PHA
BB32-   98        TYA
BB33-   00        BRK
BB34-   00        BRK
BB35-   00        BRK
BB36-   00        BRK
BB37-   00        BRK
BB38-   00        BRK
BB39-   00        BRK
BB3A-   00        BRK
BB3B-   00        BRK
BB3C-   00        BRK
BB3D-   00        BRK
BB3E-   00        BRK
BB3F-   00        BRK
BB40-   00        BRK
BB41-   00        BRK
BB42-   00        BRK
BB43-   00        BRK
BB44-   00        BRK
BB45-   98        TYA
BB46-   00        BRK
BB47-   C8        INY
BB48-   D0 C0     BNE   $BB0A
BB4A-   D0 B8     BNE   $BB04
BB4C-   D0 D8     BNE   $BB26
BB4E-   A0 00     LDY   #$00
BB50-   B8        CLV
BB51-   C0 60     CPY   #$60
BB53-   50 10     BVC   $BB65
BB55-   B0 D0     BCS   $BB27
BB57-   60        RTS
BB58-   50 40     BVC   $BB9A
BB5A-   C0 A0     CPY   #$A0
BB5C-   C0 00     CPY   #$00
BB5E-   10 C8     BPL   $BB28
BB60-   C8        INY
BB61-   60        RTS
BB62-   00        BRK
BB63-   00        BRK
BB64-   00        BRK
BB65-   00        BRK
BB66-   00        BRK
BB67-   00        BRK
BB68-   00        BRK
```

↑

PRIMARY DATA BUFFER CONTINUED

↓

```
BB69-   00          BRK
BB6A-   00          BRK
BB6B-   00          BRK
BB6C-   00          BRK
BB6D-   00          BRK
BB6E-   00          BRK
BB6F-   00          BRK
BB70-   00          BRK
BB71-   00          BRK
BB72-   00          BRK
BB73-   00          BRK
BB74-   00          BRK
BB75-   00          BRK
BB76-   00          BRK
BB77-   00          BRK
BB78-   00          BRK
BB79-   28          PLP
BB7A-   C0 C0       CPY   #$C0
BB7C-   C8          INY
BB7D-   D0 A0       BNE   $BB1F
BB7F-   A0 D0       LDY   #$D0
BB81-   A0 60       LDY   #$60
BB83-   28          PLP
BB84-   C0 28       CPY   #$28
BB86-   B0 18       BCS   $BBA0
BB88-   A8          TAY
BB89-   C8          INY
BB8A-   28          PLP
BB8B-   B0 00       BCS   $BB8D
BB8D-   D0 C0       BNE   $BB4F
BB8F-   D0 00       BNE   $BB91
BB91-   00          BRK
BB92-   28          PLP
BB93-   D0 28       BNE   $BBBD
BB95-   00          BRK
BB96-   00          BRK
BB97-   48          PHA
BB98-   10 00       BPL   $BB9A
BB9A-   00          BRK
BB9B-   00          BRK
BB9C-   00          BRK
BB9D-   00          BRK
BB9E-   00          BRK
BB9F-   00          BRK
BBA0-   00          BRK
BBA1-   00          BRK
BBA2-   00          BRK
BBA3-   00          BRK
BBA4-   00          BRK
BBA5-   00          BRK
BBA6-   00          BRK
BBA7-   00          BRK
BBA8-   00          BRK
BBA9-   00          BRK
BBAA-   00          BRK
BBAB-   00          BRK
BBAC-   00          BRK
BBAD-   A8          TAY
BBAE-   D0 C8       BNE   $BB78
BBB0-   C8          INY
BBB1-   A0 B0       LDY   #$B0
BBB3-   C8          INY
BBB4-   C0 00       CPY   #$00
```

↑

PRIMARY DATA BUFFER CONTINUED

↓

```
BBB6-   00          BRK
BBB7-   C0 B0       CPY   #$B0
BBB9-   18          CLC
BBBA-   00          BRK
BBBB-   B0 C8       BCS   $BB85
BBBD-   D0 18       BNE   $BBD7
BBBF-   10 D0       BPL   $BB91
BBC1-   C8          INY
BBC2-   D0 60       BNE   $BC24
BBC4-   50 40       BVC   $BC06
BBC6-   C8          INY
BBC7-   A0 10       LDY   #$10
BBC9-   68          PLA
BBCA-   30 08       BMI   $BBD4
BBCC-   00          BRK
BBCD-   00          BRK
BBCE-   00          BRK
BBCF-   00          BRK
BBD0-   00          BRK
BBD1-   00          BRK
BBD2-   00          BRK
BBD3-   00          BRK
BBD4-   00          BRK
BBD5-   00          BRK
BBD6-   00          BRK
BBD7-   00          BRK
BBD8-   00          BRK
BBD9-   00          BRK
BBDA-   00          BRK
BBDB-   00          BRK
BBDC-   00          BRK
BBDD-   00          BRK
BBDE-   00          BRK
BBDF-   50 28       BVC   $BC09
BBE1-   A0 D0       LDY   #$D0
BBE3-   C0 A0       CPY   #$A0
BBE5-   B8          CLV
BBE6-   C0 C8       CPY   #$C8
BBE8-   60          RTS
BBE9-   28          PLP
BBEA-   A8          TAY
BBEB-   B0 00       BCS   $BBED
BBED-   60          RTS
BBEE-   28          PLP
BBEF-   C8          INY
BBF0-   C0 00       CPY   #$00
BBF2-   10 C0       BPL   $BBB4
BBF4-   D0 C0       BNE   $BBB6
BBF6-   28          PLP
BBF7-   B0 00       BCS   $BBF9
BBF9-   A0 A0       LDY   #$A0
BBFB-   10 B0       BPL   $BBAD
BBFD-   B8          CLV
BBFE-   00          BRK
BBFF-   00          BRK
```

↑

PRIMARY DATA BUFFER CONTINUED

↓

```
BC00-   00          BRK
BC01-   00          BRK
BC02-   00          BRK
BC03-   00          BRK
BC04-   00          BRK
BC05-   00          BRK
BC06-   00          BRK
BC07-   00          BRK
```

CONTAINS MERGED LAST 3 BITS OF ALL BYTES

154 BYTE SECONDARY DATA BUFFER (5 BIT FORMAT)

```
BC08-   00          BRK
BC09-   00          BRK
BC0A-   00          BRK
BC0B-   00          BRK
BC0C-   00          BRK
BC0D-   00          BRK
BC0E-   00          BRK
BC0F-   00          BRK
BC10-   00          BRK
BC11-   00          BRK
BC12-   20 20 30    JSR   $3020
BC15-   A0 10       LDY   #$10
BC17-   38          SEC
BC18-   E0 00       CPX   #$00
BC1A-   08          PHP
BC1B-   08          PHP
BC1C-   C0 E8       CPY   #$E8
BC1E-   A8          TAY
BC1F-   68          PLA
BC20-   70 20       BVS   $BC42
BC22-   00          BRK
BC23-   58          CLI
BC24-   78          SEI
BC25-   10 38       BPL   $BC5F
BC27-   78          SEI
BC28-   40          RTI
BC29-   B8          CLV
BC2A-   60          RTS
BC2B-   80          ???
BC2C-   30 80       BMI   $BBAE
BC2E-   00          BRK
BC2F-   68          PLA
BC30-   10 70       BPL   $BCA2
BC32-   E0 00       CPX   #$00
BC34-   00          BRK
BC35-   00          BRK
BC36-   00          BRK
BC37-   00          BRK
BC38-   00          BRK
BC39-   00          BRK
BC3A-   00          BRK
BC3B-   00          BRK
BC3C-   00          BRK
BC3D-   00          BRK
BC3E-   00          BRK
BC3F-   00          BRK
BC40-   00          BRK
BC41-   00          BRK
BC42-   00          BRK
BC43-   00          BRK
BC44-   00          BRK
BC45-   E0 A0       CPX   #$A0
BC47-   D0 90       BNE   $BBD9
BC49-   60          RTS
BC4A-   00          BRK
BC4B-   20 80 28    JSR   $2880
BC4E-   18          CLC
BC4F-   10 28       BPL   $BC79
BC51-   D0 28       BNE   $BC7B
BC53-   10 E8       BPL   $BC3D
BC55-   70 78       BVS   $BCCF
BC57-   30 00       BMI   $BC59
BC59-   F8          SED
```

↑

SECONDARY DATA BUFFER CONTINUED

↓

```
BC5A-   A0 08       LDY   #$08
BC5C-   20 00 C0    JSR   $C000
BC5F-   30 30       BMI   $BC91
BC61-   20 00 78    JSR   $7800
BC64-   70 10       BVS   $BC76
BC66-   00          BRK
BC67-   00          BRK
BC68-   00          BRK
BC69-   00          BRK
BC6A-   00          BRK
BC6B-   00          BRK
BC6C-   00          BRK
BC6D-   00          BRK
BC6E-   00          BRK
BC6F-   00          BRK
BC70-   00          BRK
BC71-   00          BRK
BC72-   00          BRK
BC73-   00          BRK
BC74-   00          BRK
BC75-   00          BRK
BC76-   00          BRK
BC77-   00          BRK
BC78-   00          BRK
BC79-   08          PHP
BC7A-   68          PLA
BC7B-   A0 F0       LDY   #$F0
BC7D-   08          PHP
BC7E-   00          BRK
BC7F-   18          CLC
BC80-   58          CLI
BC81-   18          CLC
BC82-   78          SEI
BC83-   38          SEC
BC84-   A8          TAY
BC85-   10 60       BPL   $BCE7
BC87-   08          PHP
BC88-   C8          INY
BC89-   30 08       BMI   $BC93
BC8B-   40          RTI
BC8C-   38          SEC
BC8D-   88          DEY
BC8E-   98          TYA
BC8F-   68          PLA
BC90-   70 08       BVS   $BC9A
BC92-   38          SEC
BC93-   70 00       BVS   $BC95
BC95-   30 78       BMI   $BD0F
BC97-   A8          TAY
BC98-   00          BRK
BC99-   00          BRK
```

↑

SECONDARY DATA BUFFER CONTINUED

↓

```
BC9A-   AB          ???
BC9B-   AD AE AF    LDA   $AFAE
BC9E-   B5 B6       LDA   $B6,X
BCA0-   B7          ???
BCA1-   BA          TSX
BCA2-   BB          ???
BCA3-   BD BE BF    LDA   $BFBE,X
BCA6-   D6 D7       DEC   $D7,X
BCA8-   DA          ???
BCA9-   DB          ???
BCAA-   DD DE DF    CMP   $DFDE,X
BCAD-   EA          NOP
```

5 BIT TO DISK COD (WRITE) TRANSLATE TABLE

```
BCAE-   EB          ???
BCAF-   ED EE EF    SBC   $EFEE
BCB2-   F5 F6       SBC   $F6,X
BCB4-   F7          ???
BCB5-   FA          ???
BCB6-   FB          ???
BCB7-   FD FE FF    SBC   $FFFE,X
```

RWTS PATCH AREA

```
BCBA-   1C          ???
BCBB-   1C          ???
BCBC-   1C          ???
BCBD-   00          BRK
BCBE-   00          BRK
BCBF-   00          BRK
BCC0-   A4 2D       LDY   $2D
BCC2-   B9 D0 3C    LDA   $3CD0,Y     OLD
BCC5-   A0 05       LDY   #$05        PATCH
BCC7-   4C 0A 3E    JMP   $3E0A
BCCA-   00          BRK
BCCB-   00          BRK
BCCC-   00          BRK
BCCD-   00          BRK
BCCE-   00          BRK
BCCF-   00          BRK
BCD0-   00          BRK
BCD1-   05 0A       ORA   $0A
BCD3-   02          ???               OLD
BCD4-   07          ???               PATCH
BCD5-   0C          ???
BCD6-   04          ???
BCD7-   09 01       ORA   #$01
BCD9-   06 0B       ASL   $0B
BCDB-   03          ???
BCDC-   08          PHP
BCDD-   00          BRK
BCDE-   00          BRK
BCDF-   00          BRK
BCE0-   00          BRK
BCE1-   00          BRK
BCE2-   00          BRK
BCE3-   00          BRK
BCE4-   00          BRK
BCE5-   00          BRK
BCE6-   00          BRK
BCE7-   00          BRK
BCE8-   00          BRK
BCE9-   00          BRK
BCEA-   00          BRK
BCEB-   00          BRK
BCEC-   00          BRK
BCED-   00          BRK
BCEE-   00          BRK
BCEF-   00          BRK
BCF0-   00          BRK
BCF1-   00          BRK
BCF2-   00          BRK
BCF3-   00          BRK
BCF4-   00          BRK
BCF5-   00          BRK
BCF6-   00          BRK
BCF7-   00          BRK
BCF8-   00          BRK
BCF9-   00          BRK
BCFA-   00          BRK
```

```
BCFB-  00          BRK
BCFC-  00          BRK
BCFD-  00          BRK
BCFE-  00          BRK
BCFF-  00          BRK
```

DOS 3.2.1 INSERTION

RWTS MAIN ROUTINE

```
BD00-  84 48       STY   $48      UPON ENTRY A & Y POINT AT THE
BD02-  85 49       STA   $49      I/O CONTROL BLOCK (IOB)
BD04-  A0 01       LDY   #$01     } GET SLOT #
BD06-  B1 48       LDA   ($48),Y  }
BD08-  AA          TAX
BD09-  8C F8 04    STY   $04F8    ONE RECAL PER CALL
BD0C-  A0 0F       LDY   #$0F     } CHANGE SLOT?
BD0E-  D1 48       CMP   ($48),Y  }
BD10-  F0 1B       BEQ   $BD2D
BD12-  8A          TXA            SAVE NEW SLOT #
BD13-  48          PHA
BD14-  B1 48       LDA   ($48),Y  GET PREVIOUS SLOT #
BD16-  AA          TAX
BD17-  68          PLA            GET NEW
BD18-  48          PHA
BD19-  91 48       STA   ($48),Y  IT WILL BE PREVIOUS
BD1B-  BD 8E C0    LDA   $C08E,X  GET INTO READ MODE
BD1E-  A0 08       LDY   #$08     WAIT FOR DRIVE TO TURN OFF
BD20-  BD 8C C0    LDA   $C08C,X  DOES ANY DATA REMAIN
BD23-  DD 8C C0    CMP   $C08C,X  STABLE FOR 96 MICROSECONDS?
BD26-  D0 F6       BNE   $BD1E    IF SO, DISK CAN'T BE SPINNING
BD28-  88          DEY
BD29-  D0 F8       BNE   $BD23
BD2B-  68          PLA            GET NEW SLOT #
BD2C-  AA          TAX
BD2D-  BD 8E C0    LDA   $C08E,X  READ MODE ON NEW DRIVE
BD30-  BD 8C C0    LDA   $C08C,X
BD33-  BD 8C C0    LDA   $C08C,X  GET A DATA BYTE
BD36-  48          PHA            DELAY
BD37-  68          PLA
BD38-  8E F8 05    STX   $05F8    SAVE SLOT
BD3B-  DD 8C C0    CMP   $C08C,X  DATA CHANGED? (DISK SPINNING)
BD3E-  08          PHP            MAYBE, REMEMBER
BD3F-  BD 89 C0    LDA   $C089,X  TURN MOTOR ON IN CASE
BD42-  A0 06       LDY   #$06     } COPY DEVICE CHAR. TABLE PTR (DCT)
BD44-  B1 48       LDA   ($48),Y  } AND DATA BUFFER PTR TO ZPAGE
BD46-  99 36 00    STA   $0036,Y  }
BD49-  C8          INY            }
BD4A-  C0 0A       CPY   #$0A     }
BD4C-  D0 F6       BNE   $BD44    }
```

BD55 INSERTION

```
BD4E-  A0 02       LDY   #$02     GET DRIVE #
BD50-  B1 48       LDA   ($48),Y
BD52-  A0 10       LDY   #$10     SAME AS BEFORE?
BD54-  D1 48       CMP   ($48),Y
BD56-  F0 06       BEQ   $BD5E    YES
BD58-  91 48       STA   ($48),Y  NO, IT WILL BE
BD5A-  28          PLP
BD5B-  A0 00       LDY   #$00     FORCE WAIT FOR MOTOR TO COME ON
BD5D-  08          PHP
BD5E-  6A          ROR            WHICH DRIVE?
BD5F-  BD 8A C0    LDA   $C08A,X  ASSUME DRIVE Ø (1)
BD62-  B0 03       BCS   $BD67    Dos 3.2.1 (BD61)
BD64-  BD 8B C0    LDA   $C08B,X  ELSE, SELECT 1 (2)
BD67-  66 35       ROR   $35      SAVE CARRY IN ZPAGE AS DRIVE INDICATOR
BD69-  A0 02       LDY   #$02
BD6B-  B1 3C       LDA   ($3C),Y  GET MOTOR ON TIME FROM DCT
BD6D-  85 46       STA   $46
BD6F-  C8          INY
```

EXTERNAL ENT IS THROUGH $B7B TO ALLOW DISAB FOR INTERRUPT

```
BD70-  B1 3C       LDA   ($3C),Y
BD72-  85 47       STA   $47
BD74-  C8          INY
BD75-  B1 48       LDA   ($48),Y
BD77-  20 3B BE    JSR   $BE3B
BD7A-  28          PLP
BD7B-  D0 0D       BNE   $BD8A
BD7D-  A0 12       LDY   #$12
BD7F-  88          DEY
BD80-  D0 FD       BNE   $BD7F
BD82-  E6 46       INC   $46
BD84-  D0 F7       BNE   $BD7D
BD86-  E6 47       INC   $47
BD88-  D0 F3       BNE   $BD7D
BD8A-  A0 0C       LDY   #$0C
BD8C-  B1 48       LDA   ($48),Y
BD8E-  F0 55       BEQ   $BDE5
BD90-  C9 04       CMP   #$04
BD92-  F0 53       BEQ   $BDE7
BD94-  6A          ROR
BD95-  08          PHP
BD96-  B0 03       BCS   $BD9B
BD98-  20 00 B8    JSR   $B800
BD9B-  A0 30       LDY   #$30
BD9D-  8C 78 05    STY   $0578
BDA0-  AE F8 05    LDX   $05F8
BDA3-  20 65 B9    JSR   $B965
BDA6-  90 1F       BCC   $BDC7
BDA8-  CE 78 05    DEC   $0578
BDAB-  10 F3       BPL   $BDA0
BDAD-  AD 78 04    LDA   $0478
BDB0-  48          PHA
BDB1-  A9 60       LDA   #$60
BDB3-  20 82 BE    JSR   $BE82
BDB6-  CE F8 04    DEC   $04F8
BDB9-  D0 23       BNE   $BDDE
BDBB-  A9 00       LDA   #$00
BDBD-  20 3B BE    JSR   $BE3B
BDC0-  68          PLA
BDC1-  20 3B BE    JSR   $BE3B
BDC4-  4C 9B BD    JMP   $BD9B
BDC7-  A4 2E       LDY   $2E
BDC9-  CC 78 04    CPY   $0478
BDCC-  F0 22       BEQ   $BDF0
BDCE-  AD 78 04    LDA   $0478
BDD1-  48          PHA
BDD2-  98          TYA
BDD3-  20 82 BE    JSR   $BE82
BDD6-  68          PLA
BDD7-  CE 78 05    DEC   $0578
BDDA-  10 E5       BPL   $BDC1
BDDC-  30 CA       BMI   $BDA8
BDDE-  68          PLA
BDDF-  A9 40       LDA   #$40
BDE1-  28          PLP
BDE2-  4C 29 BE    JMP   $BE29
BDE5-  F0 40       BEQ   $BE27
BDE7-  A0 03       LDY   #$03
BDE9-  B1 48       LDA   ($48),Y
BDEB-  85 2F       STA   $2F
BDED-  4C 9C BE    JMP   $BE9C
BDF0-  A0 03       LDY   #$03
BDF2-  B1 48       LDA   ($48),Y
```

SECOND HALF MOTOR ON TIME

GET DESTINATION TRACK

MAY AS WELL SEEK WHILE WAITING

WAS MOTOR ALREADY ON?

100 μSECS

WAIT FOR MOTOR TO COME UP TO SPEED

WHAT OPERATION?

NULL, DO NOTHING

FORMAT (INIT) DISK?

C=1 READ Ø WRITE

READ?

CONVERT WRITE DATA TO 5 BIT CODES

48 ERROR RETRYS

SLOT #

SEARCH FOR SECTOR HDR

GOT IT

ELSE RETRY UP TO 48 TIMES

SAVE REAL TRACK

PRETEND WE ARE ON TRACK 80

ONE TRY ONLY AT THIS

THEN DRIVE ERROR

RECAL THE ARM TO TRACK Ø

TRACK I WANTED

SEEK TO IT

TRY AGAIN FOR SECTOR HDR

STILL ON TRACK WE WERE ON

YES

NO, SAVE

COMPUTE CORRECTION NEEDED

COUNT RETRY

AND SEEK TO IT

THIS ISN'T WORKING, RECAL ARM

DRIVE ERROR 40

GO HANDLE ERROR

GO TO EXIT

FORMAT DISK

GET VOLID

FORCE IT TO SECTOR HDRS

GO FORMAT DISK

GET VOLID EXPECTED

```
BDF4-  48           PHA
BDF5-  A5 2F        LDA   $2F
BDF7-  A0 0E        LDY   #$0E
BDF9-  91 48        STA   ($48),Y
BDFB-  68           PLA
BDFC-  F0 08        BEQ   $BE06
BDFE-  C5 2F        CMP   $2F
BE00-  F0 04        BEQ   $BE06
BE02-  A9 20        LDA   #$20
BE04-  D0 DB        BNE   $BDE1
BE06-  A0 05        LDY   #$05
BE08-  A5 2D        LDA   $2D
BE0A-  D1 48        CMP   ($48),Y
BE0C-  F0 09        BEQ   $BE17
BE0E-  CE 78 05     DEC   $0578
BE11-  10 8D        BPL   $BDA0
BE13-  A9 80        LDA   #$80
BE15-  D0 CA        BNE   $BDE1
BE17-  28           PLP
BE18-  90 18        BCC   $BE32
BE1A-  20 FD B8     JSR   $B8FD
BE1D-  08           PHP
BE1E-  B0 88        BCS   $BDA8
BE20-  28           PLP
BE21-  20 C1 B9     JSR   $B9C1
BE24-  AE F8 05     LDX   $05F8
BE27-  18           CLC
BE28-  24 38        BIT   $38
BE2A-  A0 0D        LDY   #$0D
BE2C-  91 48        STA   ($48),Y
BE2E-  BD 88 C0     LDA   $C088,X
BE31-  60           RTS
BE32-  20 6A B8     JSR   $B86A
BE35-  90 F0        BCC   $BE27
BE37-  A9 10        LDA   #$10
BE39-  B0 EE        BCS   $BE29
BE3B-  48           PHA
BE3C-  A0 01        LDY   #$01
BE3E-  B1 3C        LDA   ($3C),Y
BE40-  6A           ROR
BE41-  68           PLA
BE42-  90 08        BCC   $BE4C
BE44-  0A           ASL
BE45-  20 4C BE     JSR   $BE4C
BE48-  4E 78 04     LSR   $0478
BE4B-  60           RTS
BE4C-  85 2E        STA   $2E
BE4E-  BD 80 C0     LDA   $C080,X
BE51-  BD 82 C0     LDA   $C082,X
BE54-  BD 84 C0     LDA   $C084,X
BE57-  BD 86 C0     LDA   $C086,X
BE5A-  20 7B BE     JSR   $BE7B
BE5D-  B9 78 04     LDA   $0478,Y
BE60-  24 35        BIT   $35
BE62-  30 03        BMI   $BE67
BE64-  B9 F8 04     LDA   $04F8,Y
BE67-  8D 78 04     STA   $0478
BE6A-  A5 2E        LDA   $2E
BE6C-  24 35        BIT   $35
BE6E-  30 05        BMI   $BE75
BE70-  99 F8 04     STA   $04F8,Y
BE73-  10 03        BPL   $BE78
BE75-  99 78 04     STA   $0478,Y
```

GET VOLID FOUND IN SECTOR HDR
RETURN IT TO IOB
VOLID=Ø MATCHES ANY
OTHERWISE, DO THEY MATCH?
NO, VOL MISSMATCH ERROR [2Ø]
IS THIS THE SECTOR WANTED?
NO, RETRY NEXT ONE
ELSE, READ ERROR [8Ø]
READ OR WRITE?
READ - GET 5 BIT DATA [READ]
BAD CHKSUM - RETRY
CONVERT READ DATA TO 8 BIT
GET SLOT #
[NORMAL RETURN EXIT]
STORE ERROR NUMBER IN IOB
TURN MOTOR OFF
AND LEAVE
WRITE 5 BIT CODES [WRITE]
WRITE PROTECT ERROR [1Ø]
[SEEK SUBRTN]
SAVE TRACK
TWO PHASE DISC?
SEEK TO TRK IN ACC.
NO
YES, DOUBLE TRACK #
SEEK
THEN HALVE RESULT
SAVE TRACK WANTED
TURN OFF ALL STEP MOTOR PHASES
GET SLOT # IN Y
GET DRIVE Ø'S CURR TRACK #
DRIVE Ø?
YES
ELSE, GET DRIVE 1'S CURR TRACK #
SET CURRENT TRACK FOR ABS-SEEK
TRACK WANTED
WHICH DRIVE?
IF DRIVE Ø, REMEMBER NEW ARM LOC.
ELSE DRIVE 1'S TABLE IS UPDATED

```
BE78-   4C 1E BA   JMP   $BA1E        NOW GO DO ABSOLUTE SEEK
BE7B-   8A         TXA
BE7C-   4A         LSR
BE7D-   4A         LSR        PUT SLOT #
BE7E-   4A         LSR          IN Y
BE7F-   4A         LSR
BE80-   A8         TAY
BE81-   60         RTS
BE82-   48         PHA          SAVE TRACK   SET TRACK #
BE83-   A0 02      LDY   #$02
BE85-   B1 48      LDA   ($48),Y   GET DRIVE #
BE87-   6A         ROR
BE88-   66 35      ROR   $35       SAVE IT
BE8A-   20 7B BE   JSR   $BE7B     GET SLOT IN Y
BE8D-   68         PLA             AND TRACK IN A
BE8E-   0A         ASL             ASSUME TWO PHASE TRACKS
BE8F-   24 35      BIT   $35       WHICH DRIVE?
BE91-   30 05      BMI   $BE98
BE93-   99 F8 04   STA   $04F8,Y   STORE TRACK IN DRIVE Ø TABLE
BE96-   10 03      BPL   $BE9B
BE98-   99 78 04   STA   $0478,Y   OR IN DRIVE 1 TABLE
BE9B-   60         RTS
BE9C-   A9 80      LDA   #$80
BE9E-   8D 78 04   STA   $0478
BEA1-   A9 00      LDA   #$00      RECAL ARM TO
BEA3-   85 41      STA   $41         TRACK Ø
BEA5-   20 1E BA   JSR   $BA1E
BEA8-   A9 AA      LDA   #$AA      HANDY CONSTANT
BEAA-   85 4A      STA   $4A
BEAC-   A0 50      LDY   #$50      80 SYNCS BETWEEN SECTORS
BEAE-   84 47      STY   $47
BEB0-   A9 27      LDA   #$27      FIRST TIME ON TRK WRITE 39*256 SYNCS
BEB2-   85 4B      STA   $4B
BEB4-   BD 8D C0   LDA   $C08D,X   CLEAR WRITE MODE
BEB7-   BD 8E C0   LDA   $C08E,X   READ MODE WHILE UPDATING LATCH
BEBA-   A9 FF      LDA   #$FF      WRITE FF'S (AUTO SYNC CODES)
BEBC-   9D 8F C0   STA   $C08F,X
BEBF-   DD 8C C0   CMP   $C08C,X   CLEAR LATCH (WRITE OFF)
BEC2-   24 00      BIT   $00       (TIMING)
2 BEC4-   88         DEY
2 3 BEC5-   F0 0F      BEQ   $BED6
3 BEC7-   48         PHA
4 BEC8-   68         PLA
2 BEC9-   EA         NOP
3 BECA-   48         PHA
4 BECB-   68         PLA
2 BECC-   EA         NOP
2 BECD-   EA         NOP
5 BECE-   9D 8D C0   STA   $C08D,X   WRITE ON
4 BED1-   DD 8C C0   CMP   $C08C,X   WRITE OFF
3 BED4-   B0 EE      BCS   $BEC4
5 BED6-   C6 4B      DEC   $4B
2 BED8-   D0 F0      BNE   $BECA     DONE 39 TIMES
3 BEDA-   A4 47      LDY   $47       80 BYTES BEFORE SECTOR HDR
2 BEDC-   EA         NOP
2 BEDD-   EA         NOP
3 BEDE-   D0 06      BNE   $BEE6     JUMP INTO LOOP
3 BEE0-   48         PHA
4 BEE1-   68         PLA
3 BEE2-   48         PHA
4 BEE3-   68         PLA             (TIMING)
6 BEE4-   C1 00      CMP   ($00,X)
2 BEE6-   EA         NOP
```

FORMAT DISK

FILL TRACK WITH FF'S

WRITE SYNC'S EVERY 27 μSECS

31+5 cycles

```
BEE7-  9D 8D C0    STA  $C08D,X     WRITE 80 SYNC'S BETWEEN SECTORS
BEEA-  DD 8C C0    CMP  $C08C,X
BEED-  88          DEY
BEEE-  D0 F0       BNE  $BEE0
BEF0-  A9 D5       LDA  #$D5        (D5)
BEF2-  20 CA BF    JSR  $BFCA       (AA)   WRITE SECTOR HDR PROLOG
BEF5-  A9 AA       LDA  #$AA        (B5)
BEF7-  20 CB BF    JSR  $BFCB
BEFA-  A9 B5       LDA  #$B5
BEFC-  20 CB BF    JSR  $BFCB
BEFF-  A5 2F       LDA  $2F         — VOL (TWO 5 BIT CODES)
BF01-  20 BB BF    JSR  $BFBB
BF04-  A5 41       LDA  $41
BF06-  20 BB BF    JSR  $BFBB       — TRACK (TWO 5 BIT CODES)
BF09-  A5 4B       LDA  $4B
BF0B-  20 BB BF    JSR  $BFBB       — SECTOR (TWO 5 BIT CODES)
BF0E-  A5 2F       LDA  $2F
BF10-  45 41       EOR  $41         } COMPUTE CHECKSUM
BF12-  45 4B       EOR  $4B
BF14-  48          PHA
BF15-  4A          LSR
BF16-  05 4A       ORA  $4A
BF18-  9D 8D C0    STA  $C08D,X     } WRITE CHECKSUM (1ST HALF)
BF1B-  DD 8C C0    CMP  $C08C,X
BF1E-  68          PLA
BF1F-  09 AA       ORA  #$AA        SECOND HALF OF CHECKSUM
BF21-  20 CA BF    JSR  $BFCA
BF24-  A9 DE       LDA  #$DE        (DE)
BF26-  20 CB BF    JSR  $BFCB       (AA)   WRITE SECTOR HDR EPILOG
BF29-  A9 AA       LDA  #$AA        (EB)
BF2B-  20 CB BF    JSR  $BFCB
BF2E-  A9 EB       LDA  #$EB
BF30-  20 CB BF    JSR  $BFCB
BF33-  A9 FF       LDA  #$FF        BEGIN WRITING SYNC'S AGAIN OVER DATA AREA
BF35-  20 CB BF    JSR  $BFCB
BF38-  A0 02       LDY  #$02        TWICE THRU NEXT SYNC LOOP
BF3A-  84 46       STY  $46
BF3C-  A0 AD       LDY  #$AD        FIRST TIME 173 SYNCS (NEXT 256)
BF3E-  D0 06       BNE  $BF46       JUMP INTO LOOP
BF40-  88          DEY              ↑
BF41-  F0 0D       BEQ  $BF50       |
BF43-  48          PHA              |
BF44-  68          PLA              |   DUMMY DATA PORTION
BF45-  EA          NOP              |
BF46-  48          PHA              |
BF47-  68          PLA              |   WRITE 429 SYNC'S
BF48-  9D 8D C0    STA  $C08D,X     |
BF4B-  DD 8C C0    CMP  $C08C,X     |
BF4E-  B0 F0       BCS  $BF40       ↓
BF50-  C6 46       DEC  $46
BF52-  D0 F2       BNE  $BF46
BF54-  A4 47       LDY  $47         SYNCS TO WRITE PRIOR TO NEXT SECT
BF56-  18          CLC
BF57-  24 00       BIT  $00
BF59-  9D 8D C0    STA  $C08D,X     SYNC
BF5C-  BD 8C C0    LDA  $C08C,X     SECTOR #
BF5F-  A5 4B       LDA  $4B         INTERLEAVE
BF61-  69 0A       ADC  #$0A        NEW SECTOR
BF63-  85 4B       STA  $4B
BF65-  E9 0C       SBC  #$0C        DONE?
BF67-  F0 0A       BEQ  $BF73
BF69-  B0 01       BCS  $BF6C       NO, SECTOR IS GOOD
BF6B-  2C 85 4B    BIT  $4B85       STA $4B IF MODULO IS NEEDED
```

```
BF6E-  A9 FF      LDA  #$FF      GO WRITE SYNCS FOR THIS SECTOR
BF70-  4C E7 BE   JMP  $BEE7
-------------------------------------------------------------------
BF73-  48 (17)    PHA  3         (TIMING)        END OF TRACK
BF74-  68         PLA  4                          CHECK IT
BF75-  A4 47      LDY  3 $47     SYNCS BETWEEN SECTORS
BF77-  BD 8D C0   LDA  4 $C08D,X SENSE WRITE PROTECT
BF7A-  BD 8E C0   LDA    $C08E,X READ MODE
BF7D-  30 34      BMI    $BFB3  ITS WRITE PROTECTED
BF7F-  88         DEY
BF80-  48      -> PHA
BF81-  68         PLA
BF82-  EA         NOP            DELAY PAST 80
BF83-  EA         NOP
BF84-  24 00      BIT    $00     SYNC'S TO INSURE
BF86-  48         PHA            ENOUGH SPACE BETWEEN
BF87-  68         PLA            LAST SECTOR AND FIRST
BF88-  88         DEY
BF89-  D0 F5      BNE    $BF80
BF8B-  20 65 B9   JSR    $B965  GO READ SECTOR HDR
BF8E-  B0 04      BCS    $BF94  OOPS, NO GOOD
BF90-  A5 2D      LDA    $2D    WHAT SECTOR WAS READ?
BF92-  F0 0A      BEQ    $BF9E  0 - OK
-------------------------------------------------------------------
BF94-  A4 47      LDY    $47    OTHERWISE, TRY LESS SYNCS
BF96-  88         DEY           FOR A SHORTER TRACK
BF97-  C0 10      CPY    #$10   BUT NO LESS THAN 16
BF99-  90 18      BCC    $BFB3  OR ITS A BAD DRIVE
BF9B-  4C AE BE   JMP    $BEAE  TRY TO FORMAT IT AGAIN
-------------------------------------------------------------------
BF9E-  E6 41      INC    $41    NEXT TRACK
BFA0-  A5 41      LDA    $41
BFA2-  C9 23      CMP    #$23   DONE ALL TRACKS?
BFA4-  B0 12      BCS    $BFB8  YES
BFA6-  0A         ASL           NO, DOUBLE FOR TWO PHASE SEEK
BFA7-  20 1E BA   JSR    $BA1E  AND MOVE ARM
BFAA-  A4 47      LDY    $47
BFAC-  C8         INY            TRY MORE SYNCS BETWEEN SECTORS
BFAD-  C8         INY
BFAE-  84 47      STY    $47
BFB0-  4C AE BE   JMP    $BEAE  GO FORMAT NEW TRACK
-------------------------------------------------------------------
BFB3-  A9 40      LDA    #$40   DRIVE ERROR                  [40]
BFB5-  4C 29 BE   JMP    $BE29  EXIT
-------------------------------------------------------------------
BFB8-  4C 27 BE   JMP    $BE27  NO ERRORS
-------------------------------------------------------------------
BFBB-  48      3  PHA            SAVE BYTE          WRITE ONE
BFBC-  4A      2  LSR            USING ODD BITS FIRST  BYTE TO
BFBD-  05 4A   3  ORA    $4A     OR IN NON USEFUL BITS  DISK
BFBF-  9D 8D C0 5 STA    $C08D,X WRITE FIRST NIBBLE
BFC2-  DD 8C C0 4 CMP    $C08C,X                    (TIMING CRITICAL
BFC5-  68       4 PLA            GET BYTE
BFC6-  C1 00    6 CMP    ($00,X) (TIMING)
BFC8-  09 AA    2 ORA    #$AA    OR IN NON USEFUL BITS
BFCA-  EA       2 NOP            (TIMING)
BFCB-  48       3 PHA
BFCC-  68       4 PLA    WRITE ONE NIBBLE ENTRY
BFCD-  EA       2 NOP
BFCE-  9D 8D C0 5 STA    $C08D,X WRITE EVEN NIBBLE
BFD1-  DD 8C C0 4 CMP    $C08C,X
BFD4-  60       6 RTS
-------------------------------------------------------------------
BFD5-  E8         INX            PATCH AREA
BFD6-  F0 01      BEQ    $BFD9   NOT IN
BFD8-  60         RTS            USE (PATCH TO PREVIOUS RELEASE)
BFD9-  4C DD A5   JMP    $A5DD   SEE CONTACT #3 PG 3
-------------------------------------------------------------------
BFDC-  8D 63 AA   STA    $AA63   SET ADDITIONAL DEFAULTS    SEE
BFDF-  8D 70 AA   STA    $AA70   (B=0)                      #A0E2
BFE2-  8D 71 AA   STA    $AA71
```

DOS 3.3 PATCH

```
BFE5-  60          RTS
BFE6-  20 5B A7    JSR   $A75B    RESET STATE/WARMSTART
BFE9-  8C B7 AA    STY   $AAB7    RUN NOT INTERRUPTED NOW
BFEC-  60          RTS
BFED-  20 7E AE    JSR   $AE7E    SAVE FIOWA
BFF0-  AE 9B B3    LDX   $B39B    } RESTORE STACK
BFF3-  9A          TXS
BFF4-  20 16 A3    JSR   $A316    CLOSE ALL FILES
BFF7-  BA          TSX            } SAVE STACK AGAIN
BFF8-  8E 9B B3    STX   $B39B
BFFB-  A9 09       LDA   #$09     } EXIT FIO RC=9 "DISK FULL"
BFFD-  4C 85 B3    JMP   $B385
```

SEE $AGDS

SEE $B377

NOTES

1. It is not clear who uses the value at #3FF4 created by first entry processing.

2. DOS 3.2 differs from 3.1 as follows:
   - ECHO INPUT prompts under MON O not MON I
   - BASIC used to be passed "↑(CR)", Now "(CR)" only for intercepted lines.
   - Some commands may not be entered in direct mode (READ, WRITE, POSITION, OPEN, APPEND)
   - DOS now automatically relocates an FP program from RAM FP BASIC to ROM FP BASIC and vice versa when it is loaded.
   - Lower case is now supported when disk files are read with INPUT statements.
   - Some commands are allowed to create a new file, others will not. Originally, any reference to a file that didn't exist created one which might have to be deleted (LOAD X created then deleted X)
   - Contents of the X register at entry to the File Manager (FIO) indicates whether a new file may be created.

     X=0 create new file

     X=¬0 file must already exist
   - References in FIO to DOS close subroutine require that all of DOS must be preserved

when using FIO.

- After entering the Monitor and then warmstarting DOS, a 48:ØØ is no longer necessary.
- All of DOS patch area is gone
- RWTS now disables from interrupts while in operation.
- B (Byte offset) is now Ø by default

3. a CTL-D output or any KSWL call force an exit from write mode.

4. FIO write range of bytes. Length must be one less that that desired.

5. DOS 3.2 documentation was incorrect in several areas:

Pg. 130 Deleted file track ptr is stored as the last byte in file name.
"END MARK" is really high byte of sector count.

Pg. 132 3Ø-33 are: 3Ø track now being allocated
31 direction of track allocation
(+1, toward track 35
-1, toward track Ø)

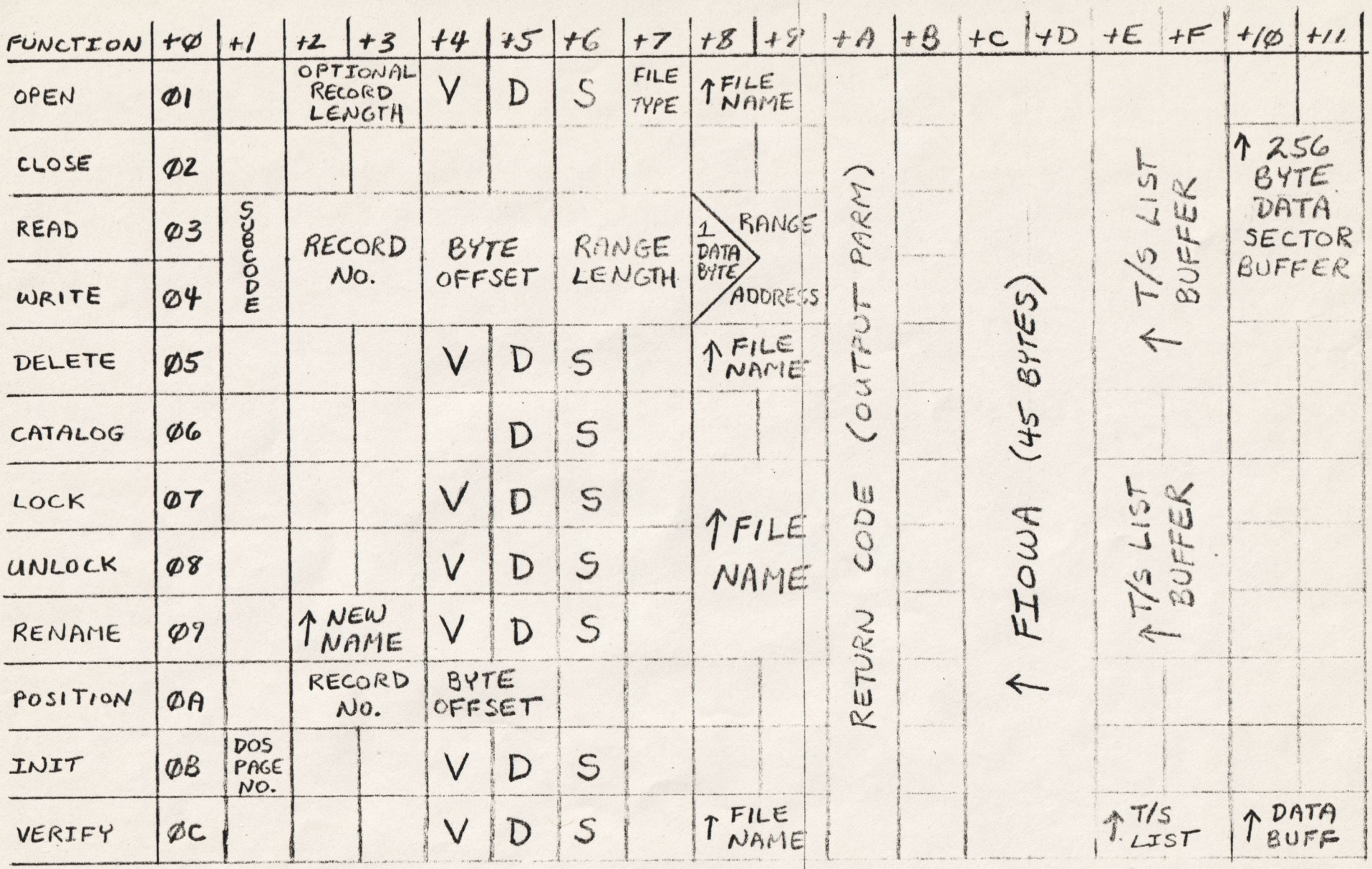
- 32, 33 } NOT USED

6. Hidden restrictions. DOS can not handle more than 16 sectors per track or more than 50 tracks per disk.

7. The DOS version number is always at $B3BE (or as appropriate to machine size). It is 02 for DOS 3.2.

8. All file type bit patterns are now defined:

00	Text	08	Sequential?
01	Integer	10	Random?
02	Applesoft	20	Applesoft? LOADable
04	Binary	40	B?



FIO FILE MANAGER PARM LIST FORMAT

REQUIRED INPUTS

DOS 3.2 ZERO PAGE USEAGE

```
0000-
0008-
0010-
0018-
0020-                       00       00 00
0028- D0 07 D0 07 E7 0B 12 FE
0030-          AA       00 07 C4
0038- 1B FD          3C 00 FF 00
0040- 00 00 00 98 2D 98 EF D8
0048- 00 B7 00 08 00 96
0050-
0058-
0060-                             FD
0068- FC FD FD                    D2
0070- FD       ED EC       ED
0078-
0080-
0088-
0090-
0098-
00A0-
00A8-                             FD
00B0- FF
00B8-
00C0-
00C8-       61 95 00 08
00D0-                   02
00D8- FD 03
00E0-
00E8-
00F0-
00F8-
```

24	CURSOR HORIZONTAL (DOS)
26,27	SECTOR-READ BUFFER ↑ (ROM) & SCRATCH SPACE (RWTS)
28,29	BASL/BASH (DOS)
2A	SEGMENT MERGE COUNTER (ROM, BOOT) SCRATCH SPACE (RWTS)
2B	BOOT SLOT*16 (ROM) SCRATCH SPACE (RWTS)
2C	CHECKSUM FROM SECTOR HDR (RWTS)
2D	SECTOR # FROM SECTOR HDR (RWTS)
2E	TRACK # FROM SECTOR HDR (RWTS)
2F	VOL # FROM SECTOR HDR (RWTS)
33	PROMPT CHARACTER (DOS)
35	DRIVE # IN HIGH BIT (RWTS)
36,37	CSWL, CSWH (DOS)
38,39	KSWL, KSWH (DOS)
3C	WORKBYTE (ROM) MERGE WORKBYTE (BOOT) DEVICE CHAR. TABLE ↑ (RWTS)
3D	SECTOR # (ROM) DEVICE CHAR. TABLE ↑ (RWTS)
3E,3F	↑ ROM SECTOR-READ SUBRTN (BOOT) BUFFER ↑ (RWTS)
40,41	DOS IMAGE ↑ (BOOT) FILE BUFFER ↑ (DOS) (#41) FORMAT TRACK COUNTER (RWTS)
42,43	BUFFER ↑ (DOS)
44,45	NUMERIC OPERAND (DOS)
46,47	SCRATCH SPACE (RWTS)
48,49	IOB ↑ (RWTS)
4A,4B	INT BASIC LOMEM ↑ (DOS) FORMAT DISKETTE WORKSPACE (RWTS)
4C,4D	INT BASIC HIMEM ↑ (DOS)
67,68	FP BASIC PGM START (DOS)
69,6A	FP BASIC VARS START (DOS)
6F,70	FP STRING START (DOS)
73,74	FP HIMEM ↑ (DOS)
76	FP LINE NO. HIGH (DOS)
AF,B0	FP PGM END (DOS)
CA,CB	INT BASIC PGM ↑ (DOS)
CC,CD	INT BASIC VARS ↑ (DOS)
DG	FP PGM TOO BIG (DOS)
D8,D9	INT BASIC LINE NO. (DOS) FP BASIC ONERR (DOS)

DOS 3.2 FILE BUFFERS (TYPICAL)

($96ØØ-$9CF8, 48K system)

DOS 3.2 FILE BUFFERS

3RD BUFFER

(SEE BUFFER #1 FOR DETAILS)

```
9600- 9F 00 10 0A 00 4B 03 4D
9608- 36 B9 A8 03 03 6F B3 03
9610- 00 01 11 14 00 61 28 A0
9618- A0 C4 C9 D3 CB A0 C9 C9
9620- 29 47 01 1C 16 00 50 B1
9628- 0B 00 03 61 28 CD C1 D3
9630- D4 C5 D2 A0 C4 C9 D3 CB
9638- C5 D4 D4 C5 29 47 01 17
9640- 17 00 50 B2 1C 00 03 61
9648- 28 D6 C5 D2 D3 C9 CF CE
9650- A0 B3 AE B2 29 01 17 18
9658- 00 63 03 50 B3 1E 00 03
9660- 61 28 B1 B6 AD C6 C5 C2
9668- AD B7 B9 29 01 2F 1E 00
9670- 63 03 61 28 A0 A0 C3 CF
9678- D0 D9 D2 C9 C7 C8 D4 A0
9680- B1 B9 B7 B9 A0 A0 A0 C1
9688- D0 D0 CC C5 A0 C3 CF CD
9690- D0 D5 D4 C5 D2 A0 C9 CE
9698- C3 AE 29 01 05 28 00 51
96A0- 01 9F 00 00 00 00 00 00
96A8- 00 00 00 00 00 00 00 00
96B0- 00 00 00 00 00 00 00 00
96B8- 00 00 00 00 00 00 00 00
96C0- 00 00 00 00 00 00 00 00
96C8- 00 00 00 00 00 00 00 00
96D0- 00 00 00 00 00 00 00 00
96D8- 00 00 00 00 00 00 00 00
96E0- 00 00 00 00 00 00 00 00
96E8- 00 00 00 00 00 00 00 00
96F0- 00 00 00 00 00 00 00 00
96F8- 00 00 00 00 00 00 00 00
```

DATA SECTOR BUFFER

```
9700- 00 00 00 00 00 00 00 00
9708- 00 00 00 00 12 0B 00 00
9710- 00 00 00 00 00 00 00 00
9718- 00 00 00 00 00 00 00 00
9720- 00 00 00 00 00 00 00 00
9728- 00 00 00 00 00 00 00 00
9730- 00 00 00 00 00 00 00 00
9738- 00 00 00 00 00 00 00 00
9740- 00 00 00 00 00 00 00 00
9748- 00 00 00 00 00 00 00 00
9750- 00 00 00 00 00 00 00 00
9758- 00 00 00 00 00 00 00 00
9760- 00 00 00 00 00 00 00 00
9768- 00 00 00 00 00 00 00 00
9770- 00 00 00 00 00 00 00 00
9778- 00 00 00 00 00 00 00 00
9780- 00 00 00 00 00 00 00 00
9788- 00 00 00 00 00 00 00 00
9790- 00 00 00 00 00 00 00 00
9798- 00 00 00 00 00 00 00 00
97A0- 00 00 00 00 00 00 00 00
97A8- 00 00 00 00 00 00 00 00
97B0- 00 00 00 00 00 00 00 00
97B8- 00 00 00 00 00 00 00 00
97C0- 00 00 00 00 00 00 00 00
97C8- 00 00 00 00 00 00 00 00
97D0- 00 00 00 00 00 00 00 00
97D8- 00 00 00 00 00 00 00 00
```

T/S LIST BUFFER

```
97E0- 00 00 00 00 00 00 00 00
97E8- 00 00 00 00 00 00 00 00
97F0- 00 00 00 00 00 00 00 00
97F8- 00 00 00 00 00 00 00 00
9800- 12 0C 12 0C 00 12 0B 01
9808- 00 7A 00 00 00 7A 00 00
9810- 00 00 01 01 00 00 00 01
9818- 00 00 00 00 00 02 00 00
9820- 00 00 00 00 00 81 70 01
9828- FF 11 00 00 00 00 C5 CC
9830- CC CF A0 A0 A0 A0 A0 A0
9838- A0 A0 A0 A0 A0 A0 A0 A0
9840- A0 A0 A0 A0 A0 A0 A0 A0
9848- A0 A0 A0 00 98 00 97 00
9850- 96 00 00 00 FF FF 00 00
9858- FF FF 00 00 FF FF 00 00
9860- FF FF 00 00 FF FF 00 00
9868- FF FF 00 00 FF FF 00 00
9870- FF FF 00 00 FF FF 00 00
9878- FF FF 00 00 FF FF 00 00
9880- FF FF 00 00 FF FF 00 00
9888- FF FF 00 00 FF FF 00 00
9890- FF FF 00 00 FF FF 00 00
9898- FF FF 00 00 FF FF 00 00
98A0- FF FF 00 00 FF FF 00 00
98A8- FF FF 00 00 FF FF 00 00
98B0- FF FF 00 00 FF FF 00 00
98B8- FF FF 00 00 FF FF 00 00
98C0- FF FF 00 00 FF FF 00 00
98C8- FF FF 00 00 FF FF 00 00
98D0- FF FF 00 00 FF FF 00 00
98D8- FF FF 00 00 FF FF 00 00
98E0- FF FF 00 00 FF FF 00 00
98E8- FF FF 00 00 FF FF 00 00
98F0- FF FF 00 00 FF FF 00 00
98F8- FF FF 00 00 FF FF 00 00
9900- FF FF 00 00 FF FF 00 00
9908- FF FF 00 00 FF FF 00 00
9910- FF FF 00 00 FF FF 00 00
9918- FF FF 00 00 FF FF 00 00
9920- FF FF 00 00 FF FF 00 00
9928- FF FF 00 00 FF FF 00 00
9930- FF FF 00 00 FF FF 00 00
9938- FF FF 00 00 FF FF 00 00
9940- FF FF 00 00 FF FF 00 00
9948- FF FF 00 00 FF FF 00 00
9950- FF FF 00 00 FF FF 00 00
9958- FF FF 00 00 FF FF 00 00
9960- FF FF 00 00 FF FF 00 00
9968- FF FF 00 00 FF FF 00 00
9970- FF FF 00 00 FF FF 00 00
9978- FF FF 00 00 FF FF 00 00
9980- FF FF 00 00 FF FF 00 00
9988- FF FF 00 00 FF FF 00 00
9990- FF FF 00 00 FF FF 00 00
9998- FF FF 00 00 FF FF 00 00
99A0- FF FF 00 00 FF FF 00 00
99A8- FF FF 00 00 FF FF 00 00
99B0- FF FF 00 00 FF FF 00 00
99B8- FF FF 00 00 FF FF 00 00
99C0- FF FF 00 00 FF FF 00 00
99C8- FF FF 00 00 FF FF 00 00
99D0- FF FF 00 00 FF FF 00 00
```

FIO WORKAREA IMAGE

FILENAME

LINK PTRS

2ND BUFFER

DATA SECTOR BUFFER

T/S LIST BUFFER

```
99D8- FF FF 00 00 FF FF 00 00
99E0- FF FF 00 00 FF FF 00 00
99E8- FF FF 00 00 FF FF 00 00
99F0- FF FF 00 00 FF FF 00 00
99F8- FF FF 00 00 FF FF 00 00
9A00- FF FF 00 00 FF FF 00 00
9A08- FF FF 00 00 FF FF 00 00
9A10- FF FF 00 00 FF FF 00 00
9A18- FF FF 00 00 FF FF 00 00
9A20- FF FF 00 00 FF FF 00 00
9A28- FF FF 00 00 FF FF 00 00
9A30- FF FF 00 00 FF FF 00 00
9A38- FF FF 00 00 FF FF 00 00
9A40- FF FF 00 00 FF FF 00 00
9A48- FF FF 00 00 FF FF 00 00
9A50- FF FF 00 00 FF FF 00 00
9A58- FF FF 00 00 FF FF 00 00
9A60- FF FF 00 00 FF FF 00 00
9A68- FF FF 00 00 FF FF 00 00
9A70- FF FF 00 00 FF FF 00 00
9A78- FF FF 00 00 FF FF 00 00
9A80- 00 FF 00 00 FF FF 00 00
9A88- FF FF 00 00 FF FF 00 00
9A90- FF FF 00 00 FF FF 00 00
9A98- FF FF 00 00 FF FF 53 9A
9AA0- 53 99 53 98 2D 98 00 00
9AA8- FF FF 00 00 FF FF 00 00
9AB0- FF FF 00 00 FF FF 00 00
9AB8- FF FF 00 00 FF FF 00 00
9AC0- FF FF 00 00 FF FF 00 00
9AC8- FF FF 00 00 FF FF 00 00
9AD0- FF FF 00 00 FF FF 00 00
9AD8- FF FF 00 00 FF FF 00 00
9AE0- FF FF 00 00 FF FF 00 00
9AE8- FF FF 00 00 FF FF 00 00
9AF0- FF FF 00 00 FF FF 00 00
9AF8- FF FF 00 00 FF FF 00 00
9B00- FF FF 00 00 FF FF 00 00
9B08- FF FF 00 00 FF FF 00 00
9B10- FF FF 00 00 FF FF 00 00
9B18- FF FF 00 00 FF FF 00 00
9B20- FF FF 00 00 FF FF 00 00
9B28- FF FF 00 00 FF FF 00 00
9B30- FF FF 00 00 FF FF 00 00
9B38- FF FF 00 00 FF FF 00 00
9B40- FF FF 00 00 FF FF 00 00
9B48- FF FF 00 00 FF FF 00 00
9B50- FF FF 00 00 FF FF 00 00
9B58- FF FF 00 00 FF FF 00 00
9B60- FF FF 00 00 FF FF 00 00
9B68- FF FF 00 00 FF FF 00 00
9B70- FF FF 00 00 FF FF 00 00
9B78- FF FF 00 00 FF FF 00 00
9B80- FF FF 00 00 FF FF 00 00
9B88- FF FF 00 00 FF FF 00 00
9B90- FF FF 00 00 FF FF 00 00
9B98- FF FF 00 00 FF FF 00 00
9BA0- FF FF 00 00 FF FF 00 00
9BA8- FF FF 00 00 FF FF 00 00
9BB0- FF FF 00 00 FF FF 00 00
9BB8- FF FF 00 00 FF FF 00 00
9BC0- FF FF 00 00 FF FF 00 00
9BC8- FF FF 00 00 FF FF 00 00
```

FIO WORKAREA IMAGE

FILENAME

LINK POINTERS

1ST BUFFER

CURRENT DATA SECTOR BUFFER

```
9BD0- FF FF 00 00 FF FF 00 00
9BD8- FF FF 00 00 FF FF 00 00
9BE0- FF FF 00 00 FF FF 00 00
9BE8- FF FF 00 00 FF FF 00 00
9BF0- FF FF 00 00 FF FF 00 00
9BF8- FF FF 00 00 FF FF 00 00
9C00- FF FF 00 00 FF FF 00 00
9C08- FF FF 00 00 FF FF 00 00
9C10- FF FF 00 00 FF FF 00 00
9C18- FF FF 00 00 FF FF 00 00
9C20- FF FF 00 00 FF FF 00 00
9C28- FF FF 00 00 FF FF 00 00
9C30- FF FF 00 00 FF FF 00 00
9C38- FF FF 00 00 FF FF 00 00
9C40- FF FF 00 00 FF FF 00 00
9C48- FF FF 00 00 FF FF 00 00
9C50- FF FF 00 00 FF FF 00 00
9C58- FF FF 00 00 FF FF 00 00
9C60- FF FF 00 00 FF FF 00 00
9C68- FF FF 00 00 FF FF 00 00
9C70- FF FF 00 00 FF FF 00 00
9C78- FF FF 00 00 FF FF 00 00
9C80- FF FF 00 00 FF FF 00 00
9C88- FF FF 00 00 FF FF 00 00
9C90- FF FF 00 00 FF FF 00 00
9C98- FF FF 00 00 FF FF 00 00
9CA0- FF FF 00 00 FF FF 00 00
9CA8- FF FF 00 00 FF FF 00 00
9CB0- FF FF 00 00 FF FF 00 00
9CB8- FF FF 00 00 FF FF 00 00
9CC0- FF FF 00 00 FF FF 00 00
9CC8- FF FF 00 00 FF FF 00 00
9CD0- FF FF 00 00 FF FF 00 00
9CD8- FF FF 00 00 FF FF 00 00
9CE0- FF FF 00 00 FF FF 00 00
9CE8- FF FF 00 00 FF FF 00 00
9CF0- FF A6 9C A6 9B A6 9A 80
9CF8- 9A
```

CURRENT TRACK/SECTOR LIST BUFFER

FIO WORKAREA IMAGE

FILENAME
[1ST BYTE = #$00 MEANS CLOSED]

LINK TO NEXT BUFFER (FILENAME)

LINK TO DATA SECTOR BUFFER (256 BYTES)

LINK TO T/S LIST BUFFER (256 BYTES)

LINK TO FILE MGR (FIO) WORKAREA IMAGE (45 BYTES)

DOS 3.2 UPDATE 3.2 PROGRAM

(A$800,L$700)

k8000G

UPDATE 3.2 A$800 L$700

```
0800-  A9 0C      LDA  #$0C
0802-  20 05 09   JSR  $0905    HOME, VTAB 12
0805-  20 23 09   JSR  $0923    INIT COUT/CSWL
0808-  A9 00      LDA  #$00
080A-  20 E3 08   JSR  $08E3    DISPLAY MSG #0 ("LOADING...")
080D-  20 89 09   JSR  $0989    READ DOS IMAGE T/S 00-2/A TO $1200-$3600
0810-  90 1B      BCC  $082D    IT WORKED
0812-  A9 08      LDA  #$08     ERROR
0814-  20 05 09   JSR  $0905    HOME, VTAB 8
0817-  AD 65 0E   LDA  $0E65    GET TRK
081A-  C9 02      CMP  #$02     2?
081C-  D0 07      BNE  $0825    NO, 0,1
081E-  AD 66 0E   LDA  $0E66    YES, GET SEC
0821-  C9 0B      CMP  #$0B     SEC B?
0823-  F0 21      BEQ  $0846    YES
0825-  A9 07      LDA  #$07     NO, MSG #7 ("UNABLE TO READ...")
0827-  20 E3 08   JSR  $08E3    SAY SO, ERROR BEFORE END
082A-  4C B5 08   JMP  $08B5    EXIT
082D-  AD 06 1E   LDA  $1E06    OK READ, GET TRACK 0, SECTOR C, OFFSET 6
0830-  4D 0D 1E   EOR  $1E0D    DOS ADDR 1D06 XOR 1D0D (2A75 XOR 1B00)
0833-  49 6E      EOR  #$6E     =6E
0835-  D0 0F      BNE  $0846    NO, NOT RIGHT DOS
0837-  AD BE 34   LDA  $34BE    YES, GET TRACK 2, SECTOR B, OFFS $BC
083A-  49 02      EOR  #$02     DOS LOC $33BE=2 (VTOC DOS RELEASE #)
083C-  D0 08      BNE  $0846    NO, WRONG RELEASE DOS
083E-  8D 66 2B   STA  $2B66    YES, CLEAR T1, SC, OFF 66 (2A66, VOLUME)
0841-  8D EB 13   STA  $13EB    T0, S1, OFF EB (36EB ← 0)
0844-  F0 08      BEQ  $084E    UNCOND BRANCH
0846-  A9 08      LDA  #$08     MSG #8 ("IMAGE NOT AVAIL...")
0848-  20 E3 08   JSR  $08E3    SAY IT
084B-  4C B5 08   JMP  $08B5    QUIT                          EXIT
084E-  A9 0A      LDA  #$0A     HOME, VTAB 10, ALL IS WELL, GET NAME
0850-  20 05 09   JSR  $0905
0853-  A9 01      LDA  #$01     MSG #1 ("INPUT NAME...")
0855-  20 E3 08   JSR  $08E3
0858-  20 6A FD   JSR  $FD6A    GET NAME
085B-  20 48 09   JSR  $0948    PROCESS IT
085E-  B0 EE      BCS  $084E    ERROR, REASK
0860-  A0 1D      LDY  #$1D
0862-  B9 2E 0E   LDA  $0E2E,Y  COPY 30 BYTES
0865-  99 75 2B   STA  $2B75,Y  TO TRACK 1 SECTOR C OFFSET 75
0868-  88         DEY           (DOS ADDR 2A75 FIRST FILE)
0869-  10 F7      BPL  $0862
086B-  A9 02      LDA  #$02
086D-  20 05 09   JSR  $0905    HOME VTAB 2
0870-  A9 02      LDA  #$02
0872-  20 E3 08   JSR  $08E3    MSG #2 ("REMEMBER...")
0875-  20 0D 09   JSR  $090D    ECHO NAME
0878-  A9 03      LDA  #$03     MSG #3 ("INSERT... [RETURN]... [ESC]...")
087A-  20 E3 08   JSR  $08E3
087D-  20 39 09   JSR  $0939    WAIT
0880-  B0 CC      BCS  $084E    ESC, GET NAME
0882-  20 85 09   JSR  $0985    WRITE DOS IMAGE
0885-  90 4A      BCC  $08D1    OK, TRY ANOTHER
0887-  A9 0A      LDA  #$0A
0889-  20 05 09   JSR  $0905    VTAB 10
088C-  AD 6E 0E   LDA  $0E6E    GET STATUS
088F-  0A         ASL           DONE
0890-  B0 03      BCS  $0895    READ ERROR $80
0892-  0A         ASL
0893-  90 04      BCC  $0899    VOLUME MIS/PROTECTED $20/$10
```

TRACK	SEC	DOSADDR	BUFADR
0	0	3000	1200
0 TO	1	3100	1300
0	9	3F00	1B00
0 TO	A	1B00	1C00
2	D	3500	3600

```
0895-  A9 09      LDA  #$09      MSG #9 ("UNABLE TO WRITE...")
0897-  D0 02      BNE  $089B
0899-  A9 0A      LDA  #$0A      MSG #A ("PROTECTED...")
089B-  20 E3 08   JSR  $08E3
089E-  A9 05      LDA  #$05      MSG #5 ("RETRY...")
08A0-  20 E3 08   JSR  $08E3
08A3-  20 39 09   JSR  $0939     WAIT
08A6-  B0 08      BCS  $08B0     ESC, QUIT
08A8-  A9 0A      LDA  #$0A      RET, RETRY, VTAB 10
08AA-  20 05 09   JSR  $0905
08AD-  4C 6B 08   JMP  $086B     RETRY
08B0-  A9 0A      LDA  #$0A      VTAB 10 RETRY
08B2-  20 05 09   JSR  $0905
08B5-  A9 06      LDA  #$06      MSG #6 ("... REBOOT")   EXIT
08B7-  20 E3 08   JSR  $08E3
08BA-  20 39 09   JSR  $0939     WAIT FOR <CR> (NOT <ESC>)
08BD-  B0 FB      BCS  $08BA
08BF-  AD 62 0E   LDA  $0E62     LAST SLOT
08C2-  4A         LSR
08C3-  4A         LSR            SHIFT S0 TO 0S
08C4-  4A         LSR
08C5-  4A         LSR
08C6-  09 C0      ORA  #$C0      F0, F1 -> CTLR ROM
08C8-  85 F1      STA  $F1
08CA-  A9 00      LDA  #$00
08CC-  85 F0      STA  $F0
08CE-  6C F0 00   JMP  ($00F0)   BOOT CS00
08D1-  A9 06      LDA  #$06      VTAB 6
08D3-  20 05 09   JSR  $0905
08D6-  A9 04      LDA  #$04      "DID IT" MSG #4
08D8-  20 E3 08   JSR  $08E3
08DB-  20 39 09   JSR  $0939     WAIT
08DE-  B0 D5      BCS  $08B5     ESC, REBOOT
08E0-  4C 4E 08   JMP  $084E     RET, GET NAME
```

DONE

```
08E3-  0A         ASL            *2 INDEX
08E4-  AA         TAX
08E5-  BD E2 09   LDA  $09E2,X   GET ADDRL
08E8-  85 F0      STA  $F0
08EA-  BD E3 09   LDA  $09E3,X   ADDR H
08ED-  85 F1      STA  $F1       F0,F1 = MSGADDR
08EF-  A0 00      LDY  #$00      0 INDEX
08F1-  B1 F0      LDA  ($F0),Y   GET BYTE
08F3-  48         PHA            SAVE FOR END TEST
08F4-  09 80      ORA  #$80      MAKE NORMAL VIDEO
08F6-  20 ED FD   JSR  $FDED     COUT
08F9-  68         PLA            GET
08FA-  30 08      BMI  $0904     DONE
08FC-  E6 F0      INC  $F0       NEXT BYTE, MORE TO DO TILL HI BIT ON
08FE-  D0 EF      BNE  $08EF
0900-  E6 F1      INC  $F1
0902-  D0 EB      BNE  $08EF
0904-  60         RTS
```

MSG DISP

A = # msg

```
0905-  48         PHA
0906-  20 58 FC   JSR  $FC58     HOME
0909-  68         PLA
090A-  85 25      STA  $25       CV
090C-  60         RTS
```

HOME

A: set to CV

```
090D-  A9 A0      LDA  #$A0
090F-  A2 00      LDX  #$00
0911-  20 ED FD   JSR  $FDED     OUTPUT to
0914-  E0 1E      CPX  #$1E      30 LEN
0916-  F0 06      BEQ  $091E     YES, CR
0918-  BD 2E 0E   LDA  $0E2E,X   NO, NEXT NAME CHAR
```

ECHO FILE NAME

```
091B-   E8          INX
091C-   D0 F3       BNE   $0911      OUTPUT
091E-   A9 8D       LDA   #$8D       QUIT WITH <CR>
0920-   4C ED FD    JMP   $FDED
0923-   A9 F0       LDA   #$F0                  INIT COUT/CSWL
0925-   85 36       STA   $36
0927-   A9 1B       LDA   #$1B
0929-   85 38       STA   $38        COUT (36,37) ← FDFØ ("COUT1")
092B-   A9 FD       LDA   #$FD
092D-   85 37       STA   $37        CSWL (38,39) ← FD1B ("KEYIN")
092F-   85 39       STA   $39
0931-   8D F4 03    STA   $03F4      PUT $FD AT 3F4
0934-   A9 87       LDA   #$87
0936-   85 33       STA   $33        PROMPT= BELL (^G)
0938-   60          RTS
0939-   20 0C FD    JSR   $FD0C                 RET/ESC
093C-   C9 8D       CMP   #$8D   <CR>
093E-   F0 06       BEQ   $0946  YES, OK          CR: CARRY CLEAR
0940-   C9 9B       CMP   #$9B   <ESC>            ESC: CARRY SET
0942-   F0 03       BEQ   $0947  YES
0944-   D0 F3       BNE   $0939  NO, WAIT
0946-   18          CLC
0947-   60          RTS
0948-   8A          TXA          NULL                   PROCESS FILE NAME
0949-   F0 2C       BEQ   $0977  YES, ERROR
094B-   86 F0       STX   $F0    SAVE LEN
094D-   A0 00       LDY   #$00
094F-   B9 00 02    LDA   $0200,Y GET BYTE
0952-   C8          INY          SKIP
0953-   C9 A0       CMP   #$A0   '$'
0955-   F0 F8       BEQ   $094F  YES, SKIP TO 1ST NON-BLANK
0957-   C9 C1       CMP   #$C1   alpha? 'A'
0959-   90 1C       BCC   $0977  <A, error
095B-   A2 00       LDX   #$00
095D-   9D 2E 0E    STA   $0E2E,X TO COPY BUF .E2E (FILENAME)
0960-   E8          INX          NEXT
0961-   E0 1E       CPX   #$1E   3Ø?, MAX?
0963-   F0 1E       BEQ   $0983  YES, OK, QUIT
0965-   B9 00 02    LDA   $0200,Y NO, NEXT
0968-   C9 8D       CMP   #$8D   CR THERE?
096A-   F0 0D       BEQ   $0979  YES, BLANK REST BUF, QUIT OK
096C-   C9 AC       CMP   #$AC   NO, ',' COMMA?
096E-   F0 09       BEQ   $0979  YES, TREAT AS CR
0970-   C4 F0       CPY   $F0    NO, END OF INPUT BUF (@ LEN)
0972-   F0 05       BEQ   $0979  YES, TREAT AT CR
0974-   C8          INY          NO, NEXT
0975-   D0 E6       BNE   $095D
0977-   38          SEC          ERROR
0978-   60          RTS          QUIT
0979-   A9 A0       LDA   #$A0
097B-   9D 2E 0E    STA   $0E2E,X BLANK TRAIL OF BUF ON CR
097E-   E8          INX
097F-   E0 1E       CPX   #$1E   TO 3Ø
0981-   D0 F8       BNE   $097B
0983-   18          CLC          OK
0984-   60          RTS          QUIT
0985-   A9 02       LDA   #$02                  READ/WRITE DOS IMAGE
0987-   D0 02       BNE   $098B  WRITE
0989-   A9 01       LDA   #$01   READ
098B-   20 B3 09    JSR   $09B3  SET UP IOB (2)
098E-   A9 0E       LDA   #$0E
0990-   A0 61       LDY   #$61   POINT TO IOB E61
0992-   20 D9 03    JSR   $03D9  CALL RWTS   TRACK Ø: 12ØØ-1EØØ
                                             TRACK 1: 1FØØ-2BØØ
                                             TRACK 2: 2CØØ-36ØØ (TO SEC A)
```

```
0995-  B0 1B      BCS   $09B2    ERROR, QUIT CARRY
0997-  AC 66 0E   LDY   $0E66    OK, GET SEC
099A-  C8         INY            NEXT
099B-  C0 0D      CPY   #$0D     13?
099D-  D0 05      BNE   $09A4    NO, OK
099F-  A0 00      LDY   #$00     YES, S=0
09A1-  EE 65 0E   INC   $0E65    NEXT TRK
09A4-  8C 66 0E   STY   $0E66    NEXT SECTOR
09A7-  EE 6A 0E   INC   $0E6A    NEXT BUF PAGE, 1200-36FF
09AA-  AD 6A 0E   LDA   $0E6A
09AD-  C9 37      CMP   #$37     DONE?
09AF-  D0 DD      BNE   $098E    NO
09B1-  18         CLC            YES, NO ERROR
09B2-  60         RTS
```

INIT IOB (2)

```
09B3-  48         PHA            SAVE CMD TYPE
09B4-  C9 01      CMP   #$01     READ?
09B6-  D0 1A      BNE   $09D2    NO, WRITE
09B8-  20 E3 03   JSR   $03E3    YES, GET RWTS TAB ADDR (IOB)
09BB-  85 F1      STA   $F1
09BD-  84 F0      STY   $F0      F0,F1 => RWTS IOB
09BF-  A0 01      LDY   #$01     OFFSET SLOT
09C1-  B1 F0      LDA   ($F0),Y  GET SLOT*16
09C3-  8D 4D 0E   STA   $0E4D    SAVE SLOT*16 IN IOB 1
09C6-  8D 5B 0E   STA   $0E5B
09C9-  C8         INY            OFFSET DRIVE
09CA-  B1 F0      LDA   ($F0),Y  DRIVE
09CC-  8D 4E 0E   STA   $0E4E    SAVE DRIVE IN IOB 1
09CF-  8D 5C 0E   STA   $0E5C
09D2-  A0 11      LDY   #$11     LENGTH
09D4-  B9 4C 0E   LDA   $0E4C,Y  } COPY IOB 1 -> IOB 2
09D7-  99 61 0E   STA   $0E61,Y  }
09DA-  88         DEY            }
09DB-  10 F7      BPL   $09D4    }
09DD-  68         PLA            GET CMD
09DE-  8D 6D 0E   STA   $0E6D    SET TO IOB 2
09E1-  60         RTS
```

MSG TABLE

```
09E2-  F8         SED
09E3-  09 87      ORA   #$87
09E5-  0A         ASL
09E6-  B9 0A 60   LDA   $600A,Y
09E9-  0B         ???
09EA-  EC 0B 96   CPX   $960B
09ED-  0C         ???
09EE-  E8         INX
09EF-  0C         ???
09F0-  25 0D      AND   $0D
09F2-  42         ???
09F3-  0D 8B 0D   ORA   $0D8B
09F6-  F0 0D      BEQ   $0A05
```

A:

0:	9F8	8:	D42
1:	A87	9:	D83
2:	AB9	A:	DF0
3:	B60		
4:	BEC		
5:	C96		
6:	CE8		
7:	D25		

MSGS

```
09F8-  0D 20 20   ORA   $2020    MSG#0
09FB-  20 20 44   JSR   $4420
09FE-  4F         ???
09FF-  53         ???
0A00-  20 33 2E   JSR   $2E33
0A03-  32         ???
0A04-  20 4D 41   JSR   $414D
0A07-  53         ???
0A08-  54         ???
0A09-  45 52      EOR   $52
0A0B-  20 2D 20   JSR   $202D
0A0E-  55 50      EOR   $50,X
0A10-  44         ???
0A11-  41 54      EOR   ($54,X)
```

<CR> DOS 3.2 MASTER - UPDATE

UTILITY <CR><CR>

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(4) <CR> (8) (NOW

LOADING DOS IMAGE) <CR>

```
0A13-   45 20        EOR   $20
0A15-   55 54        EOR   $54,X
0A17-   49 4C        EOR   #$4C
0A19-   49 54        EOR   #$54
0A1B-   59 0D 0D     EOR   $0D0D,Y
0A1E-   20 20 43     JSR   $4320
0A21-   4F           ???
0A22-   50 59        BVC   $0A7D
0A24-   52           ???
0A25-   49 47        EOR   #$47
0A27-   48           PHA
0A28-   54           ???
0A29-   20 31 39     JSR   $3931
0A2C-   37           ???
0A2D-   39 20 42     AND   $4220,Y
0A30-   59 20 41     EOR   $4120,Y
0A33-   50 50        BVC   $0A85
0A35-   4C 45 20     JMP   $2045
0A38-   43           ???
0A39-   4F           ???
0A3A-   4D 50 55     EOR   $5550
0A3D-   54           ???
0A3E-   45 52        EOR   $52
0A40-   20 49 4E     JSR   $4E49
0A43-   43           ???
0A44-   0D 20 20     ORA   $2020
0A47-   20 20 20     JSR   $2020
0A4A-   20 20 20     JSR   $2020
0A4D-   20 20 41     JSR   $4120
0A50-   4C 4C 20     JMP   $204C
0A53-   52           ???
0A54-   49 47        EOR   #$47
0A56-   48           PHA
0A57-   54           ???
0A58-   53           ???
0A59-   20 52 45     JSR   $4552
0A5C-   53           ???
0A5D-   45 52        EOR   $52
0A5F-   56 45        LSR   $45,X
0A61-   44           ???
0A62-   2E 0D 0D     ROL   $0D0D
0A65-   0D 0D 20     ORA   $200D
0A68-   20 20 20     JSR   $2020
0A6B-   20 20 20     JSR   $2020
0A6E-   20 28 4E     JSR   $4E28
0A71-   4F           ???
0A72-   57           ???
0A73-   20 4C 4F     JSR   $4F4C
0A76-   41 44        EOR   ($44,X)
0A78-   49 4E        EOR   #$4E
0A7A-   47           ???
0A7B-   20 44 4F     JSR   $4F44
0A7E-   53           ???
0A7F-   20 49 4D     JSR   $4D49
0A82-   41 47        EOR   ($47,X)
0A84-   45 29        EOR   $29
0A86-   8D 0D 50     STA   $500D
0A89-   4C 45 41     JMP   $4145
0A8C-   53           ???
0A8D-   45 20        EOR   $20
0A8F-   49 4E        EOR   #$4E
0A91-   50 55        BVC   $0AE8
0A93-   54           ???
```

MSG #1

<CR> PLEASE␣INPUT␣THE␣
"GREETING"␣PROGRAM'S␣<CR>
FILE␣NAME:␣

```
0A94-   20 54 48    JSR   $4854
0A97-   45 20       EOR   $20
0A99-   22          ???
0A9A-   47          ???
0A9B-   52          ???
0A9C-   45 45       EOR   $45
0A9E-   54          ???
0A9F-   49 4E       EOR   #$4E
0AA1-   47          ???
0AA2-   22          ???
0AA3-   20 50 52    JSR   $5250
0AA6-   4F          ???
0AA7-   47          ???
0AA8-   52          ???
0AA9-   41 4D       EOR   ($4D,X)
0AAB-   27          ???
0AAC-   53          ???
0AAD-   0D 46 49    ORA   $4946
0AB0-   4C 45 20    JMP   $2045
0AB3-   4E 41 4D    LSR   $4D41
0AB6-   45 3A       EOR   $3A
0AB8-   A0 0D       LDY   #$0D      MSG #2
0ABA-   0D 52 45    ORA   $4552
0ABD-   4D 45 4D    EOR   $4D45
0AC0-   42          ???
0AC1-   45 52       EOR   $52
0AC3-   20 54 48    JSR   $4854
0AC6-   41 54       EOR   ($54,X)
0AC8-   20 22 55    JSR   $5522
0ACB-   50 44       BVC   $0B11
0ACD-   41 54       EOR   ($54,X)
0ACF-   45 22       EOR   $22
0AD1-   20 44 4F    JSR   $4F44
0AD4-   45 53       EOR   $53
0AD6-   20 4E 4F    JSR   $4F4E
0AD9-   54          ???
0ADA-   20 43 52    JSR   $5243
0ADD-   45 41       EOR   $41
0ADF-   54          ???
0AE0-   45 0D       EOR   $0D
0AE2-   54          ???
0AE3-   48          PHA
0AE4-   45 20       EOR   $20
0AE6-   22          ???
0AE7-   47          ???
0AE8-   52          ???
0AE9-   45 45       EOR   $45
0AEB-   54          ???
0AEC-   49 4E       EOR   #$4E
0AEE-   47          ???
0AEF-   22          ???
0AF0-   20 50 52    JSR   $5250
0AF3-   4F          ???
0AF4-   47          ???
0AF5-   52          ???
0AF6-   41 4D       EOR   ($4D,X)
0AF8-   2C 20 4F    BIT   $4F20
0AFB-   52          ???
0AFC-   20 50 4C    JSR   $4C50
0AFF-   41 43       EOR   ($43,X)
0B01-   45 20       EOR   $20
0B03-   49 54       EOR   #$54
0B05-   20 49 4E    JSR   $4E49
```

<CR><CR> REMEMBER TO THAT
IS "UPDATE" DOES NOT
CREATE <CR> THE "GREETING"
PROGRAM, OR PLACE IN <CR>
THE DISK DIRECTORY <CR><CR>
THIS IS THE FILE
NAME THAT WILL BE <CR>
PLACED WITHIN THE
IMAGE; <CR><CR>

```
0B08-   0D 54 48    ORA   $4854
0B0B-   45 20       EOR   $20
0B0D-   44          ???
0B0E-   49 53       EOR   #$53
0B10-   4B          ???
0B11-   20 44 49    JSR   $4944
0B14-   52          ???
0B15-   45 43       EOR   $43
0B17-   54          ???
0B18-   4F          ???
0B19-   52          ???
0B1A-   59 0D 0D    EOR   $0D0D,Y
0B1D-   20 20 54    JSR   $5420
0B20-   48          PHA
0B21-   49 53       EOR   #$53
0B23-   20 49 53    JSR   $5349
0B26-   20 54 48    JSR   $4854
0B29-   45 20       EOR   $20
0B2B-   46 49       LSR   $49
0B2D-   4C 45 20    JMP   $2045
0B30-   4E 41 4D    LSR   $4D41
0B33-   45 20       EOR   $20
0B35-   54          ???
0B36-   48          PHA
0B37-   41 54       EOR   ($54,X)
0B39-   20 57 49    JSR   $4957
0B3C-   4C 4C 20    JMP   $204C
0B3F-   42          ???
0B40-   45 0D       EOR   $0D
0B42-   50 4C       BVC   $0B90
0B44-   41 43       EOR   ($43,X)
0B46-   45 44       EOR   $44
0B48-   20 57 49    JSR   $4957
0B4B-   54          ???
0B4C-   48          PHA
0B4D-   49 4E       EOR   #$4E
0B4F-   20 54 48    JSR   $4854
0B52-   45 20       EOR   $20
0B54-   49 4D       EOR   #$4D
0B56-   41 47       EOR   ($47,X)
0B58-   45 3A       EOR   $3A
0B5A-   0D 0D 20    ORA   $200D
0B5D-   20 20 A0    JSR   $A020
```

```
0B60-   0D 20 20    ORA   $2020
0B63-   50 4C       BVC   $0BB1
0B65-   41 43       EOR   ($43,X)
0B67-   45 20       EOR   $20
0B69-   54          ???
0B6A-   48          PHA
0B6B-   45 20       EOR   $20
0B6D-   44          ???
0B6E-   49 53       EOR   #$53
0B70-   4B          ???
0B71-   45 54       EOR   $54
0B73-   54          ???
0B74-   45 20       EOR   $20
0B76-   54          ???
0B77-   4F          ???
0B78-   20 42 45    JSR   $4542
0B7B-   20 22 55    JSR   $5522
0B7E-   50 44       BVC   $0BC4
0B80-   41 54       EOR   ($54,X)
0B82-   45 44       EOR   $44
```

MSG#3

<CR> PLACE THE DISKETTE TO BE "UPDATED" IN <CR>
THE DISK DRIVE, <CR><CR>
PRESS [RETURN] WHEN
READY <CR><CR> NOTE; IF YOU
WANT A DIFFERENT FILE
NAME, PRESS [ESC]; <CR>

```
0B84-   22          ???
0B85-   20 49 4E    JSR   $4E49
0B88-   0D 54 48    ORA   $4854
0B8B-   45 20       EOR   $20
0B8D-   44          ???
0B8E-   49 53       EOR   #$53
0B90-   4B          ???
0B91-   20 44 52    JSR   $5244
0B94-   49 56       EOR   #$56
0B96-   45 2E       EOR   $2E
0B98-   0D 0D 20    ORA   $200D
0B9B-   20 50 52    JSR   $5250
0B9E-   45 53       EOR   $53
0BA0-   53          ???
0BA1-   20 5B 52    JSR   $525B
0BA4-   45 54       EOR   $54
0BA6-   55 52       EOR   $52,X
0BA8-   4E 5D 20    LSR   $205D
0BAB-   57          ???
0BAC-   48          PHA
0BAD-   45 4E       EOR   $4E
0BAF-   20 52 45    JSR   $4552
0BB2-   41 44       EOR   ($44,X)
0BB4-   59 0D 0D    EOR   $0D0D,Y
0BB7-   4E 4F 54    LSR   $544F
0BBA-   45 3A       EOR   $3A
0BBC-   20 49 46    JSR   $4649
0BBF-   20 59 4F    JSR   $4F59
0BC2-   55 20       EOR   $20,X
0BC4-   57          ???
0BC5-   41 4E       EOR   ($4E,X)
0BC7-   54          ???
0BC8-   20 41 20    JSR   $2041
0BCB-   44          ???
0BCC-   49 46       EOR   #$46
0BCE-   46 45       LSR   $45
0BD0-   52          ???
0BD1-   45 4E       EOR   $4E
0BD3-   54          ???
0BD4-   20 46 49    JSR   $4946
0BD7-   4C 45 20    JMP   $2045
0BDA-   4E 41 4D    LSR   $4D41
0BDD-   45 2C       EOR   $2C
0BDF-   50 52       BVC   $0C33
0BE1-   45 53       EOR   $53
0BE3-   53          ???
0BE4-   20 5B 45    JSR   $455B
0BE7-   53          ???
0BE8-   43          ???
0BE9-   5D 2E 8D    EOR   $8D2E,X
0BEC-   0D 20 20    ORA   $2020
0BEF-   54          ???
0BF0-   48          PHA
0BF1-   45 20       EOR   $20
0BF3-   44          ???
0BF4-   49 53       EOR   #$53
0BF6-   4B          ???
0BF7-   45 54       EOR   $54
0BF9-   54          ???
0BFA-   45 20       EOR   $20
0BFC-   48          PHA
0BFD-   41 53       EOR   ($53,X)
0BFF-   20 42 45    JSR   $4542
```

MSG #4

<CR> THE DISKETTE HAS BEEN UPDATED, YOU MAY REMOVE IT AT THIS TIME. <CR><CR> IF YOU WISH TO "UPDATE" ANOTHER DISK- <CR> ETTE, PRESS [RETURN]. <CR><CR> OTHERWISE PRESS [ESC] TO EXIT "UPDATE" <CR>

```
0C02-   45 4E       EOR   $4E
0C04-   20 55 50    JSR   $5055
0C07-   44          ???
0C08-   41 54       EOR   ($54,X)
0C0A-   45 44       EOR   $44
0C0C-   2C 20 59    BIT   $5920
0C0F-   4F          ???
0C10-   55 20       EOR   $20,X
0C12-   4D 41 59    EOR   $5941
0C15-   52          ???
0C16-   45 4D       EOR   $4D
0C18-   4F          ???
0C19-   56 45       LSR   $45,X
0C1B-   20 49 54    JSR   $5449
0C1E-   20 41 54    JSR   $5441
0C21-   20 54 48    JSR   $4854
0C24-   49 53       EOR   #$53
0C26-   20 54 49    JSR   $4954
0C29-   4D 45 2E    EOR   $2E45
0C2C-   0D 0D 20    ORA   $200D
0C2F-   20 49 46    JSR   $4649
0C32-   20 59 4F    JSR   $4F59
0C35-   55 20       EOR   $20,X
0C37-   57          ???
0C38-   49 53       EOR   #$53
0C3A-   48          PHA
0C3B-   20 54 4F    JSR   $4F54
0C3E-   20 22 55    JSR   $5522
0C41-   50 44       BVC   $0C87
0C43-   41 54       EOR   ($54,X)
0C45-   45 22       EOR   $22
0C47-   20 41 4E    JSR   $4E41
0C4A-   4F          ???
0C4B-   54          ???
0C4C-   48          PHA
0C4D-   45 52       EOR   $52
0C4F-   20 44 49    JSR   $4944
0C52-   53          ???
0C53-   4B          ???
0C54-   2D 0D 45    AND   $450D
0C57-   54          ???
0C58-   54          ???
0C59-   45 2C       EOR   $2C
0C5B-   20 50 52    JSR   $5250
0C5E-   45 53       EOR   $53
0C60-   53          ???
0C61-   20 5B 52    JSR   $525B
0C64-   45 54       EOR   $54
0C66-   55 52       EOR   $52,X
0C68-   4E 5D 2E    LSR   $2E5D
0C6B-   0D 0D 20    ORA   $200D
0C6E-   20 4F 54    JSR   $544F
0C71-   48          PHA
0C72-   45 52       EOR   $52
0C74-   57          ???
0C75-   49 53       EOR   #$53
0C77-   45 20       EOR   $20
0C79-   50 52       BVC   $0CCD
0C7B-   45 53       EOR   $53
0C7D-   53          ???
0C7E-   20 5B 45    JSR   $455B
0C81-   53          ???
0C82-   43          ???
```

```
0C83-  5D 20 54    EOR   $5420,X
0C86-  4F          ???
0C87-  20 45 58    JSR   $5845
0C8A-  49 54       EOR   #$54
0C8C-  20 22 55    JSR   $5522
0C8F-  50 44       BVC   $0CD5
0C91-  41 54       EOR   ($54,X)
0C93-  45 22       EOR   $22
0C95-  8D 0D 0D    STA   $0D0D
0C98-  20 20 49    JSR   $4920
0C9B-  46 20       LSR   $20
0C9D-  59 4F 55    EOR   $554F,Y
0CA0-  20 57 49    JSR   $4957
0CA3-  53          ???
0CA4-  48          PHA
0CA5-  20 54 4F    JSR   $4F54
0CA8-  20 52 45    JSR   $4552
0CAB-  54          ???
0CAC-  52          ???
0CAD-  59 20 50    EOR   $5020,Y
0CB0-  52          ???
0CB1-  45 53       EOR   $53
0CB3-  53          ???
0CB4-  20 5B 52    JSR   $525B
0CB7-  45 54       EOR   $54
0CB9-  55 52       EOR   $52,X
0CBB-  4E 5D 0D    LSR   $0D5D
0CBE-  0D 20 20    ORA   $2020
0CC1-  4F          ???
0CC2-  54          ???
0CC3-  48          PHA
0CC4-  45 52       EOR   $52
0CC6-  57          ???
0CC7-  49 53       EOR   #$53
0CC9-  45 20       EOR   $20
0CCB-  50 52       BVC   $0D1F
0CCD-  45 53       EOR   $53
0CCF-  53          ???
0CD0-  20 5B 45    JSR   $455B
0CD3-  53          ???
0CD4-  43          ???
0CD5-  5D 20 54    EOR   $5420,X
0CD8-  4F          ???
0CD9-  20 45 58    JSR   $5845
0CDC-  49 54       EOR   #$54
0CDE-  20 22 55    JSR   $5522
0CE1-  50 44       BVC   $0D27
0CE3-  41 54       EOR   ($54,X)
0CE5-  45 22       EOR   $22
0CE7-  8D 0D 20    STA   $200D
0CEA-  20 49 4E    JSR   $4E49
0CED-  53          ???
0CEE-  45 52       EOR   $52
0CF0-  54          ???
0CF1-  20 41 20    JSR   $2041
0CF4-  53          ???
0CF5-  59 53 54    EOR   $5453,Y
0CF8-  45 4D       EOR   $4D
0CFA-  20 44 49    JSR   $4944
0CFD-  53          ???
0CFE-  4B          ???
0CFF-  45 54       EOR   $54
0D01-  54          ???
```

MSG #5

<CR><CR>TO IF TO YOU TO WISH TO
TO TO RETRY TO PRESS TO [RETURN]
<CR><CR> TO TO OTHERWISE TO
PRESS TO [ESC] TO TO TO EXIT
TO "UPDATE" <CR>

MSG #6

<CR>TO INSERT TO A TO
SYSTEM TO DISKETTE TO AND TO
PRESS <CR> [RETURN] TO TO
REBOOT TO DOS TO

```
0D02-   45 20        EOR   $20
0D04-   41 4E        EOR   ($4E,X)
0D06-   44           ???
0D07-   20 50 52     JSR   $5250
0D0A-   45 53        EOR   $53
0D0C-   53           ???
0D0D-   0D 5B 52     ORA   $525B
0D10-   45 54        EOR   $54
0D12-   55 52        EOR   $52,X
0D14-   4E 5D 20     LSR   $205D
0D17-   54           ???
0D18-   4F           ???
0D19-   20 52 45     JSR   $4552
0D1C-   42           ???
0D1D-   4F           ???
0D1E-   4F           ???
0D1F-   54           ???
0D20-   20 44 4F     JSR   $4F44
0D23-   53           ???
0D24-   A0 0D        LDY   #$0D
0D26-   07           ???
0D27-   07           ???
0D28-   07           ???
0D29-   20 20 55     JSR   $5520
0D2C-   4E 41 42     LSR   $4241
0D2F-   4C 45 20     JMP   $2045
0D32-   54           ???
0D33-   4F           ???
0D34-   20 52 45     JSR   $4552
0D37-   41 44        EOR   ($44,X)
0D39-   20 49 4D     JSR   $4D49
0D3C-   41 47        EOR   ($47,X)
0D3E-   45 2E        EOR   $2E
0D40-   0D 8D 0D     ORA   $0D8D
0D43-   07           ???
0D44-   07           ???
0D45-   07           ???
0D46-   20 20 49     JSR   $4920
0D49-   4D 41 47     EOR   $4741
0D4C-   45 20        EOR   $20
0D4E-   4F           ???
0D4F-   46 20        LSR   $20
0D51-   44           ???
0D52-   4F           ???
0D53-   53           ???
0D54-   20 33 2E     JSR   $2E33
0D57-   32           ???
0D58-   20 28 4D     JSR   $4D28
0D5B-   41 53        EOR   ($53,X)
0D5D-   54           ???
0D5E-   45 52        EOR   $52
0D60-   29 20        AND   #$20
0D62-   49 53        EOR   #$53
0D64-   20 4E 4F     JSR   $4F4E
0D67-   54           ???
0D68-   0D 0D 41     ORA   $410D
0D6B-   56 41        LSR   $41,X
0D6D-   49 4C        EOR   #$4C
0D6F-   41 42        EOR   ($42,X)
0D71-   4C 45 2E     JMP   $2E45
0D74-   20 20 43     JSR   $4320
0D77-   48           PHA
0D78-   45 43        EOR   $43
```

MSG #7

<CR> (3) <BEL> UNABLE TO READ IMAGE. <CR><CR>

MSG #8

<CR> (3) <BEL> IMAGE OF DOS 3.2 (MASTER) IS NOT <CR><CR> AVAILABLE. CHECK INSTRUCTIONS. <CR>

```
0D7A-  4B          ???
0D7B-  20 49 4E    JSR   $4E49
0D7E-  53          ???
0D7F-  54          ???
0D80-  52          ???
0D81-  55 43       EOR   $43,X
0D83-  54          ???
0D84-  49 4F       EOR   #$4F
0D86-  4E 53 2E    LSR   $2E53
0D89-  0D 8D 0D    ORA   $0D8D
0D8C-  07          ???
0D8D-  07          ???
0D8E-  07          ???
0D8F-  20 20 55    JSR   $5520
0D92-  4E 41 42    LSR   $4241
0D95-  4C 45 20    JMP   $2045
0D98-  54          ???
0D99-  4F          ???
0D9A-  20 57 52    JSR   $5257
0D9D-  49 54       EOR   #$54
0D9F-  45 2E       EOR   $2E
0DA1-  20 20 44    JSR   $4420
0DA4-  49 53       EOR   #$53
0DA6-  4B          ???
0DA7-  45 54       EOR   $54
0DA9-  54          ???
0DAA-  45 20       EOR   $20
0DAC-  4D 55 53    EOR   $5355
0DAF-  54          ???
0DB0-  20 42 45    JSR   $4542
0DB3-  0D 49 4E    ORA   $4E49
0DB6-  49 54       EOR   #$54
0DB8-  49 41       EOR   #$41
0DBA-  4C 49 5A    JMP   $5A49
0DBD-  45 44       EOR   $44
0DBF-  20 50 52    JSR   $5250
0DC2-  4F          ???
0DC3-  50 45       BVC   $0E0A
0DC5-  52          ???
0DC6-  4C 59 2E    JMP   $2E59
0DC9-  20 20 43    JSR   $4320
0DCC-  48          PHA
0DCD-  45 43       EOR   $43
0DCF-  4B          ???
0DD0-  20 44 49    JSR   $4944
0DD3-  53          ???
0DD4-  4B          ???
0DD5-  45 54       EOR   $54
0DD7-  54          ???
0DD8-  45 0D       EOR   $0D
0DDA-  46 4F       LSR   $4F
0DDC-  52          ???
0DDD-  20 50 52    JSR   $5250
0DE0-  4F          ???
0DE1-  50 45       BVC   $0E28
0DE3-  52          ???
0DE4-  20 49 4E    JSR   $4E49
0DE7-  53          ???
0DE8-  45 52       EOR   $52
0DEA-  54          ???
0DEB-  49 4F       EOR   #$4F
0DED-  4E 2E 8D    LSR   $8D2E
0DF0-  0D 07 07    ORA   $0707
```

MSG #9

<CR> (3) <BEL> UNABLE TO WRITE. DISKETTE MUST BE RE-INITIALIZED PROPERLY. CHECK DISKETTE FOR PROPER INSERTION. <CR>

MSG #$A

```
0DF3-  07           ???
0DF4-  20 20 44     JSR   $4420
0DF7-  49 53        EOR   #$53
0DF9-  4B           ???
0DFA-  45 54        EOR   $54
0DFC-  54           ???
0DFD-  45 20        EOR   $20
0DFF-  49 53        EOR   #$53
0E01-  20 57 52     JSR   $5257
0E04-  49 54        EOR   #$54
0E06-  45 20        EOR   $20
0E08-  50 52        BVC   $0E5C
0E0A-  4F           ???
0E0B-  54           ???
0E0C-  45 43        EOR   $43
0E0E-  54           ???
0E0F-  45 44        EOR   $44
0E11-  2E 20 20     ROL   $2020
0E14-  52           ???
0E15-  45 4D        EOR   $4D
0E17-  4F           ???
0E18-  56 45        LSR   $45,X
0E1A-  0D 57 52     ORA   $5257
0E1D-  49 54        EOR   #$54
0E1F-  45 20        EOR   $20
0E21-  50 52        BVC   $0E75
0E23-  4F           ???
0E24-  54           ???
0E25-  45 43        EOR   $43
0E27-  54           ???
0E28-  20 54 41     JSR   $4154
0E2B-  42           ???
0E2C-  2E 8D 00     ROL   $008D
0E2F-  00           BRK
0E30-  00           BRK
0E31-  00           BRK
0E32-  00           BRK
0E33-  00           BRK
0E34-  00           BRK
0E35-  00           BRK
0E36-  00           BRK
0E37-  00           BRK
0E38-  00           BRK
0E39-  00           BRK
0E3A-  00           BRK
0E3B-  00           BRK
0E3C-  00           BRK
0E3D-  00           BRK
0E3E-  00           BRK
0E3F-  00           BRK
0E40-  00           BRK
0E41-  00           BRK
0E42-  00           BRK
0E43-  00           BRK
0E44-  00           BRK
0E45-  00           BRK
0E46-  00           BRK
0E47-  00           BRK
0E48-  00           BRK
0E49-  00           BRK
0E4A-  00           BRK
0E4B-  00           BRK
0E4C-  01 60        ORA   ($60,X)
```

<CR> (3) <BEL> "DISKETTE IS WRITE PROTECTED, REMOVE WRITE PROTECT TAB. <CR>

END MSGS

GREETING FILE NAME

SLOT #16

TYPE

RWTS IOB 1 "MASK"

```
                DRIVE
0E4E-   01 00          ORA   ($00,X)
0E50-   00             BRK
0E51-   00             BRK
0E52-   5D 0E 00       EOR   $000E,X
0E55-   12             ???
0E56-   00             BRK
0E57-   00             BRK
0E58-   00             BRK
0E59-   00             BRK
0E5A-   00             BRK
0E5B-   60             RTS
0E5C-   01 00  DEV     ORA   ($00,X)
0E5E-   01 EF  CHAR    ORA   ($EF,X)
0E60-   D8     TAB     CLD
0E61-   01 60 S        ORA   ($60,X)
0E63-   01 00 V        ORA   ($00,X)
0E65-   00  T/S        BRK
0E66-   00             BRK
0E67-   5D 0E 00       EOR   $000E,X
0E6A-   12             ???
0E6B-   00             BRK
0E6C-   00             BRK
0E6D-   00 CMD         BRK
0E6E-   00 STAT        BRK
0E6F-   00             BRK
0E70-   60             RTS
0E71-   01 57          ORA   ($57,X)
0E73-   52             ???
0E74-   49 54          EOR   #$54
0E76-   54             ???
0E77-   45 4E          EOR   $4E
0E79-   20 42 59       JSR   $5942
0E7C-   20 4A 41       JSR   $414A
0E7F-   4D 45 53       EOR   $5345
0E82-   20 52 2E       JSR   $2E52
0E85-   20 48 55       JSR   $5548
0E88-   53             ???
0E89-   54             ???
0E8A-   4F             ???
0E8B-   4E 20 44       LSR   $4420
0E8E-   45 43          EOR   $43
0E90-   45 4D          EOR   $4D
0E92-   42             ???
0E93-   45 52          EOR   $52
0E95-   20 31 35       JSR   $3531
0E98-   2C 20 31       BIT   $3120
0E9B-   39 37 38       AND   $3837,Y
0E9E-   20 28 54       JSR   $5428
0EA1-   48             PHA
0EA2-   49 53          EOR   #$53
0EA4-   20 4D 45       JSR   $454D
0EA7-   53             ???
0EA8-   53             ???
0EA9-   41 47          EOR   ($47,X)
0EAB-   45 20          EOR   $20
0EAD-   49 53          EOR   #$53
0EAF-   20 46 49       JSR   $4946
0EB2-   4C 4C 45       JMP   $454C
0EB5-   52             ???
0EB6-   2C 20 57       BIT   $5720
0EB9-   48             PHA
0EBA-   59 20 52       EOR   $5220,Y
0EBD-   45 41          EOR   $41
```

RWTS IOB 2

SIGNATURE

NOT USED

WRITTEN to BY to JAMES to R. to HUSTON to DECEMBER to 15, to 1978 to (THIS to MESSAGE to IS to FILLER, to WHY to READ to IT?)

```
0EBF-   44          ???
0EC0-   20 49 54    JSR   $5449
0EC3-   3F          ???
0EC4-   29 00       AND   #$00
0EC6-   00          BRK
0EC7-   00          BRK
0EC8-   00          BRK
0EC9-   00          BRK
0ECA-   00          BRK
0ECB-   00          BRK
0ECC-   00          BRK
0ECD-   00          BRK
0ECE-   00          BRK
0ECF-   00          BRK
0ED0-   00          BRK
0ED1-   00          BRK
0ED2-   00          BRK
0ED3-   00          BRK
0ED4-   00          BRK
0ED5-   00          BRK
0ED6-   00          BRK
0ED7-   00          BRK
0ED8-   00          BRK
0ED9-   00          BRK
0EDA-   00          BRK
0EDB-   00          BRK
0EDC-   00          BRK
0EDD-   00          BRK
0EDE-   00          BRK
0EDF-   00          BRK
0EE0-   00          BRK
0EE1-   00          BRK
0EE2-   00          BRK
0EE3-   00          BRK
0EE4-   00          BRK
0EE5-   00          BRK
0EE6-   00          BRK
0EE7-   00          BRK
0EE8-   00          BRK
0EE9-   00          BRK
0EEA-   00          BRK
0EEB-   00          BRK
0EEC-   00          BRK
0EED-   00          BRK
0EEE-   00          BRK
0EEF-   00          BRK
0EF0-   00          BRK
0EF1-   00          BRK
0EF2-   00          BRK
0EF3-   00          BRK
0EF4-   00          BRK
0EF5-   00          BRK
0EF6-   00          BRK
0EF7-   00          BRK
0EF8-   00          BRK
0EF9-   00          BRK
0EFA-   00          BRK
0EFB-   00          BRK
0EFC-   00          BRK
0EFD-   00          BRK
0EFE-   00          BRK
0EFF-   00          BRK
0F00-   FF          ???
```

DON WORTH

1 DDW
2 VIC
3 DAVE ROBERTSON
4 RAM
5 DICK HOUSTON
6 DAVE REUBAN
7 PETE NIELSEN
8 PIETER LECHNER